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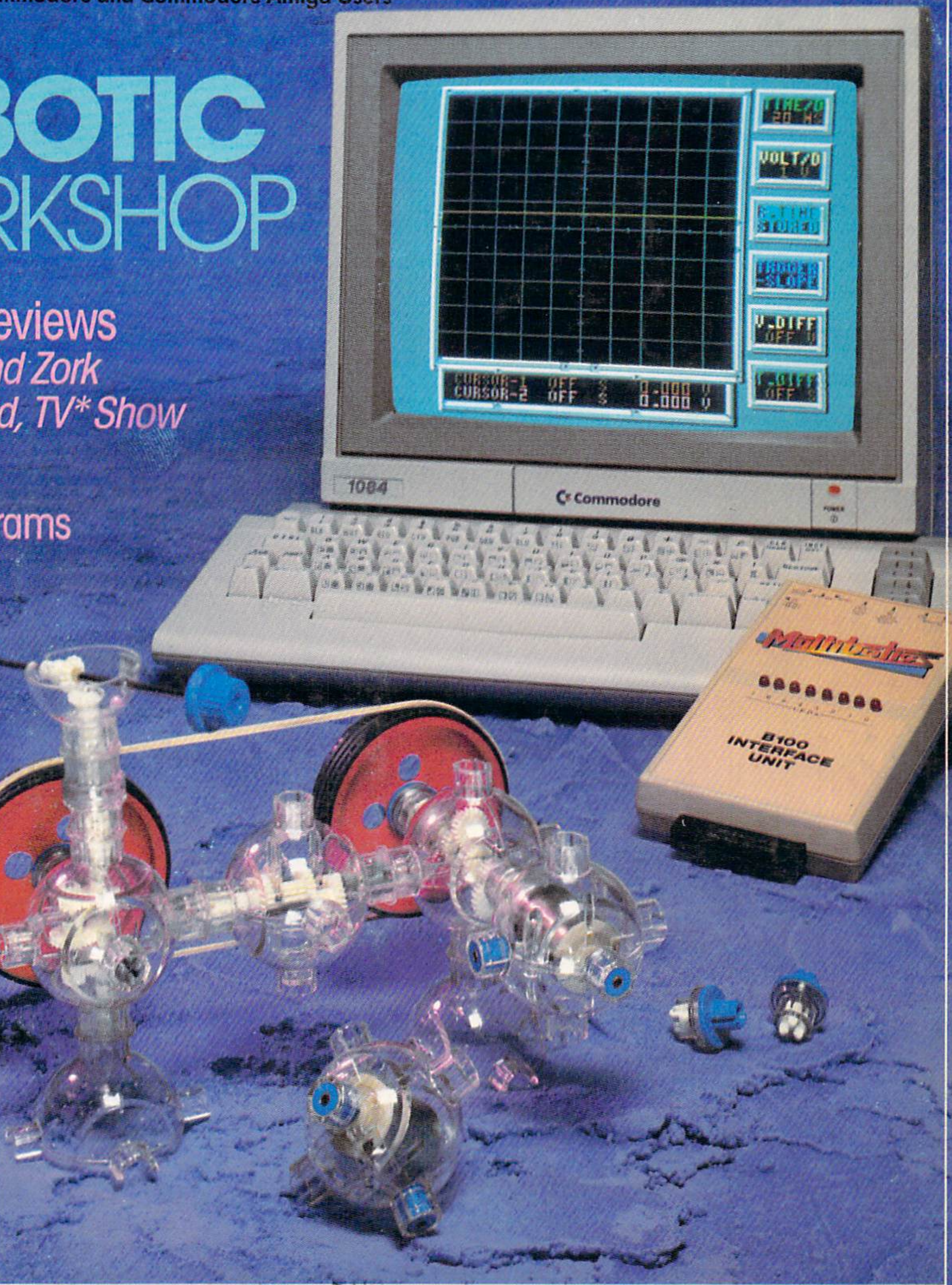
Commodore
MAGAZINE

The Magazine for Commodore and Commodore Amiga Users

THE ROBOTIC WORKSHOP

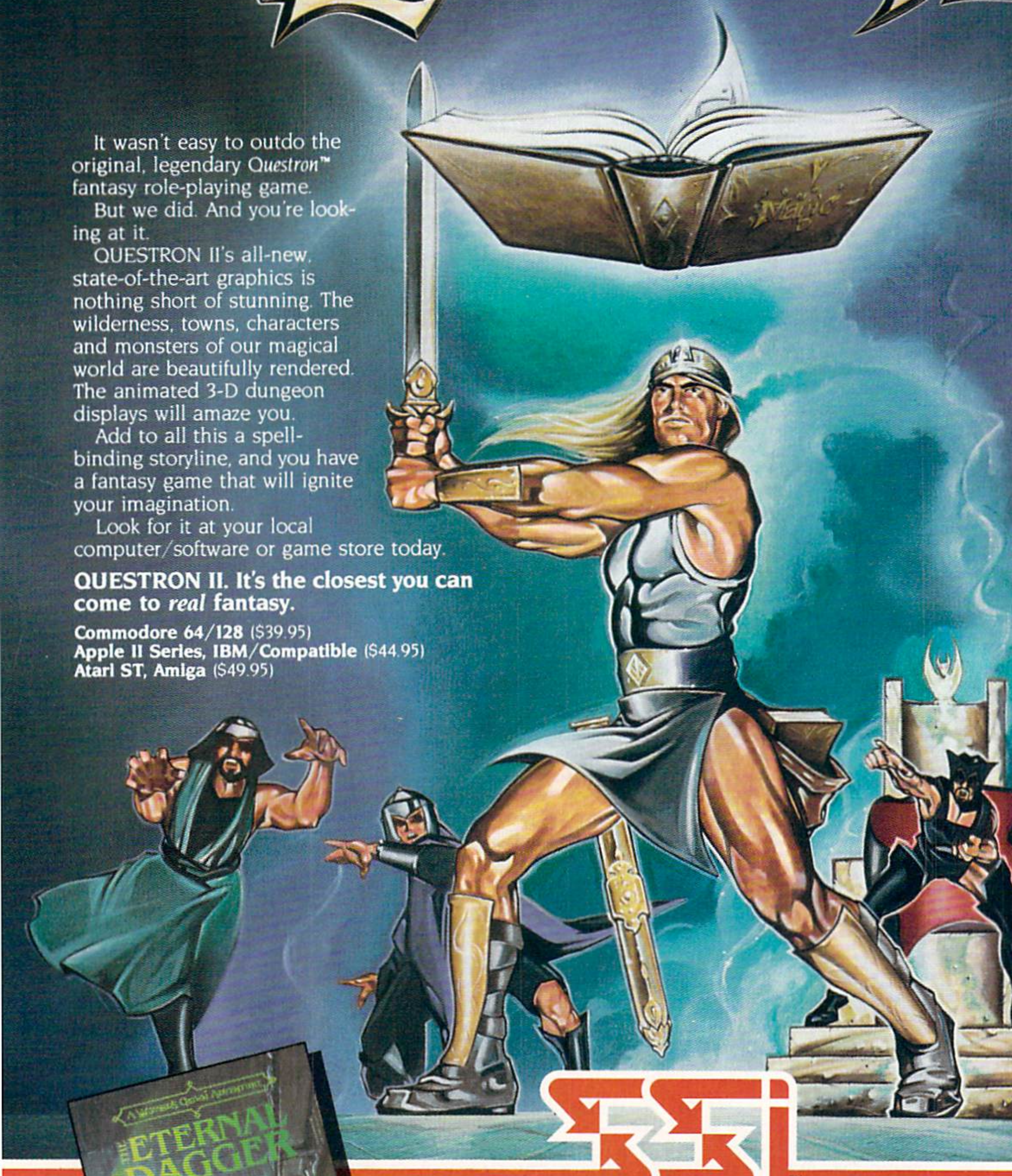
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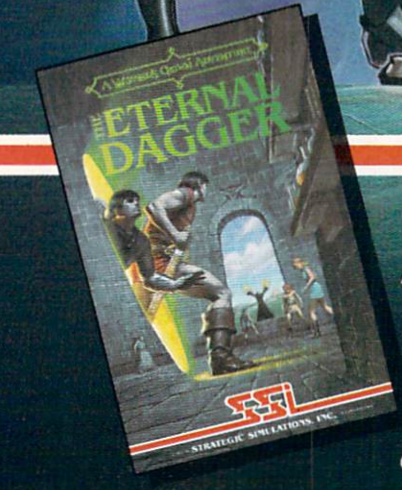
A Death Wraith attacks in one of the many dungeon levels.



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Commodore MAGAZINE

MAY 1988, *Volume 9, Number 5*



70



74

FEATURES

COVER STORY

COVER PHOTO: *Charles Bartholomew*
Model and Software: *Robotic Workshop* by Multibotics, Inc.

DEPARTMENTS



To the Editor:

Congratulations! I sent my subscription form in just the other day after I picked up the January issue of *Commodore Magazine*. I really think the new look adds a lot to the whole magazine. Because you mentioned all the things I was going to commend you about in your Letter from the Editor, I'm at a loss for words. The idea about expanding the reviews section to cover both the 64/128 and the Amiga is wonderful. (I'm getting my Amiga on Wednesday.) I could go on and on, but I think a "congratulations" and a sincere "thank-you" sums up my feelings rather well.

Keep up the great job.

Sincerely,
Kevin Takacs
West Chester, PA

To the Editor:

Well . . . that's it boys and girls . . . the honeymoon's over. I'm letting my subscription run out for good this time.

I can understand a person's desire to upgrade to a C128 . . . at least it will run C64 files . . . but AMIGA is a different thing. You're asking us to forget what we've finally learned on our C64, to learn AMIGA mush, and live in some fantasy world where the scenery is just mahvahlous.

I could share space with a few C128 articles. I could even tolerate an occasional reference to AMIGA, but now it's AMIGA this, AMIGA that. I suppose that one could say that my statement in this letter is: If it can't be done on a C64, then it's probably not worth doing.

I will not likely ever have enough "free cash" to even think of buying an AMIGA system, but with the money I save by not subscribing to *Commodore Magazine*, I can at least buy a few more beers (a far greater value).

Oh, alright, wiseguys, I am over 40 and I do hate changes. Who needs a reset button? . . .and I absolutely relish typing ",8" etc.

So, you want to knock this chip off my shoulder?? Then how about publishing "C64 Magazine," and try not to copy the old gazette.

In all fairness, I must say that I did enjoy most of the C64 articles . . . and I'm sure that you will present more. But they're not worth the frustration of weeding through the games-and-crap.

Regards,
Dale Davis
Marysville, WA

Editor's Response: Our mission—to cover all aspects of Commodore home computing, regardless of make, model or memory capacity—has never been an easy one. From 1979 when *The Pet Users Club Newsletter* (forefather of the publication you now hold in your hands) commenced publication, coverage of "new" machines vs. "old" machines has always been a most delicate matter. Our charter subscribers were probably not thrilled to see the VIC-20 getting so much attention at the expense of their PETs, and VIC-20 owners were outraged when the Commodore 64 started creeping onto our pages.

We are certainly not asking Commodore 64 owners to "start over." However, we do feel that there *are* things worth doing that only the Amiga can do. We also feel that the growing population of Amiga owners deserves coverage of their Commodore computer on our pages. That's why we're not called *The Pet Users Club Newsletter* any more.

From the Editor

Program Correction: We have received several letters concerning two problems with "Mathers of the Universe," a type-in math program for the Commodore 64 which ran in our April issue. Corrections are as follows:

1. Line 75 should read:

```
75 PRINT"[RVOFF,GRAY2,CMDR
*,RVS] [GRAY3] [RVOFF,GRAY2, CMDR
*,GRAY3,RVS,SPACE4,RVOFF,
GRAY2,CMDR *,GRAY3 ,RVS, SPACE4,
RVOFF ,GRAY2 ,CMDR *]";'BBCU
```

2. Line 1845 should read:

```
1845 DATA,,255,,,255,,,255,,,255'BXOO
```

We apologize for any inconvenience this may have caused.

Correction: Our March Table of Contents referred to the syndicated show *Secrets & Mysteries* as a Lorimar production. In fact, *Secrets & Mysteries* is produced by Triumph Communications.

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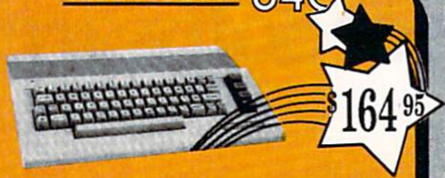
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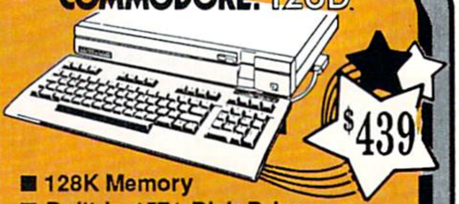
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Commodore Introduces Colt

Commodore Business Machines' latest addition to their line of PC-compatible products is the **Commodore Colt,** an IBM-PC/XT-compatible computer marketed for home businesses and those who bring work home. The **Colt** comes with 640K RAM, two clock speeds (9.7 MHz and 7.16 MHz), two internal 5.25-inch disk drives, battery-backed real time clock/calendar and parallel, serial and mouse ports. A built-in color graphics card supports CGA, MDA, Hercules and Plantronics graphic modes. The **Colt** is expandable through three full-length, IBM-PC/XT-compatible slots. Suggested retail price for the **Colt** is $899.95. For more information contact: Commodore Business Machines, Inc., 1200 Wilson Dr., West Chester, PA 19380. Or call: (215) 436-4200.



New Software at CES

Several software companies were in Las Vegas to introduce new products for Commodore computers at the Winter Consumer Electronics Show January 7-10:

Accolade is now shipping the Amiga version of **The Graphics Studio,** a graphics editor and paint program. **The Graphics Studio** offers a variety of drawing tools and retails for $49.95. Accolade also introduced **Plasmatron**, a science fiction arcade adventure game for the Commodore 64. The player must pilot his **Plasmatron** to an enemy colony and neutralize all colony life. **Plasmatron** has a suggested retail price of $14.95. For more information contact: Accolade, 20813 Stevens Creek Blvd., Cupertino, CA 95014. Or call: (408) 446-5757.

Activision introduced **Rampage**, a 3D arcade game for the 64 in which the player assumes the role of one of three movie monsters on a destructive rampage. The game retails for $34.95. In addition they were showing an upgrade of **The Music Studio** that allows Amiga users to merge songs, play multiple songs with the "jukebox," and change tempo, volume or key signature at any point in a song. This version will also run under Workbench 1.2. **The Music Studio 2.0** has a suggested retail price of $79.95.

Activision also announced the addition of five titles to their Solid Gold line, which features best-selling software at reduced prices. **Hacker II: The Doomsday Papers, The Transformers: Battle to Save the Earth,** and Infocom's **Zork I** and **Hitchhiker's Guide to the Galaxy** have been named to the Solid Gold line. Activision has also teamed up **Star Rank Boxing** and **On-Court Tennis** on a single Solid Gold "flippy" disk. Solid Gold titles carry the reduced retail price of $14.95 each. For details contact: Activision, Inc., 2350 Bayshore Pkwy., Mountain View, CA 94043. Phone: (415) 960-0410.

Data East introduced two coin-op arcade hits for the Commodore 64. **Speed Buggy** features realistic handling, acceleration and sounds on five different tracks. **Kid Niki**, a ninja adventure game requires the player to use his sword to overcome dragons and evil monsters in order to save his girlfriend. Each program retails for $29.95. For more information contact: Data East USA, Inc., 470 Needles Dr., San Jose, CA 95112. Or call: (408) 286-7074.

Electronic Arts previewed **Dan Bunten's Sport of War**, the first modem game that allows Commodore 64 owners to play against Apple II and IBM owners. **Sport of War** is a strategy/action game played against a randomly-generated geographic backdrop. Players can also play solo against the computer. **Sport of War** retails for $34.95.

For the Amiga, EA had two new simulations on hand. **Interceptor** is a flight simulator that takes the F-18 Hornet or F16 Falcon on six combat missions over the San Francisco Bay. In addition to taking off and landing at Bay Area airports, players can land and depart from the aircraft carrier USS Enterprise. **Interceptor**'s suggested retail price is $49.95 **World Tour Golf** provides 20 of the world's top golf courses to choose from, or the player can utilize the "golf course construction set" to design a custom fairway. **World Tour Golf** retails for $39.95. For further information contact: Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. Phone: (415) 571-7171.

Hi Tech Expressions introduced a number of new products for the Commodore 64 at CES. **Printpower** creates signs, cards, stationery and banners and sells for $14.95. **Sesame Street Print Kit** prints illustrated story books, greeting cards, posters and banners featuring Muppet characters from Sesame Street. Suggested retail price is $14.95. **Sesame Street Learning Library Vol. 1 & 2** includes pre-school learning activities for home and school. The program sells for $24.95. **The Computer Club** for ages 7-12 includes secret message encoder, word processor, calculator, address book and calendar. Suggested retail price is $14.95. **Matterhorn Screamer** and **The Chase on Tom Sawyer's Island** are the first in a line of Walt Disney Software arcade-style games for kids. The programs retail for $9.95 each. For details contact: Hi Tech Expressions, 1700 N.W. 65th Ave., Suite 9, Plantation, FL 33313. Phone: (800) 848-9273.

MicroIllusions introduced **Land of Legends**, a fantasy role-playing game for the Amiga (64 version to be released at a later date). **Land of Legends** packs lots of dungeons, monsters and magic into its animated full-screen graphics and retails for $49.95. For more information contact: MicroIllusions, 17408 Chatsworth St., Granada Hills, CA 91344. Or call: (800) 522-2041.

The Hunt for Red October



DataSoft has released **The Hunt for Red October**, based on Tom Clancy's best-selling novel. You are a Soviet submarine captain who wants to defect to the U.S. with his state-of-the-art vessel and 113-member crew. You plan to rendezvous with the U.S. Navy on the eastern seaboard and fake a radiation leak to account for evacuating your crew. But you must maneuver past Soviet and NATO forces to complete your top secret mission. **The Hunt for Red October** is available for the Commodore 64 at $39.95 and for the Amiga at $49.95. For further information contact: DataSoft, 19808 Nordhoff Place, Chatsworth, CA 91311. Or call: (818) 886-5922.

IntelliCreations Releases

IntelliCreations, Inc. has released three new games for Commodore computers. **BattleDroidz** is a strategy action game in which the player controls one of three droidz in combat with aliens on another planet. **BattleDroidz** for the Commodore 64 retails for $24.95, and the Amiga version sells for $34.95. **The Rubicon Alliance** was formed to avoid interplanetary war, but the pact has been broken by a hostile planet. The player is assigned eight missions to restore harmony. **The Rubicon Alliance** is available for the Commodore 64 at a suggested retail price of $19.95. As **Global Commander** the player must coordinate the earth's satellite network and monitor the actions of the 16 nuclear nations to prevent the earth's destruction. The Commodore 64 version retails for $29.95, the Amiga version for $39.95. For details contact: IntelliCreations, Inc., 19808 Nordhoff Place, Chatsworth, CA 91311. Or call: (818) 886-5922.

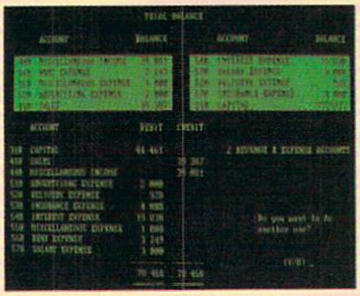
EA "Software for Life"

Electronic Arts has introduced a new software exchange program to ease users' transition in upgrading their 8-bit systems to 16-bit systems. Owners of Electronic Arts' Commodore 64 titles can purchase the identical Amiga titles for half price by sending in the original program's manual cover. The "Software for Life" program applies to all Electronic Arts' and affiliated labels' titles. For information on upgrading, call (800) 245-4525, in California call (800) 562-1112. Outside the U.S. call (415) 571-7171 ext. 555.

Magic Madness

Magic Madness is Artworx Software's latest release for the Commodore 64. In Neverland four kindly magicians ruled until the wicked sorcerer killed them and hid their powerful magic scrolls. Your mission is to overcome the sorcerer's henchmen and recover the scrolls. **Magic Madness** for the 64 retails for $19.95, and an Amiga version is in the works. For further information contact: Artworx Software, 1844 Penfield Rd., Penfield, NJ 14526. Phone: (800) 828-6573.

Pro Tutor Accounting



Professional Software, Inc. has introduced a unique package for the Commodore 128 to teach basic accounting principles. **Pro Tutor Accounting** is designed for use by accounting students, new employees or self-learners. The company has plans to release similar products in the fields of History, Geography, Math and Spelling for different age groups. **Pro Tutor Accounting** is available in a home and business version for a suggested retail price of $99 and in an educational version complete with teacher utilities for $249. For more details contact: Professional Software, Inc., 51 Fremont St., Needham, MA 02194. (800) 343-4074.

Bull Run to Chancellorsville

Electronic Arts' Strategic Studies Group has released **Bull Run to Chancellorsville** the first in a series of programs for the Commodore 64 called "Decisive Battles of the American Civil War." The program presents simulations of battles comprising the first half of the Civil War. The new series utilizes SSG's "Warpaint" graphics editor and "Warplan" war game construction kit. **Bull Run to Chancellorsville** retails for $39.95. For further details contact: Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404. Phone: (415) 571-7171.

PhotoSynthesis

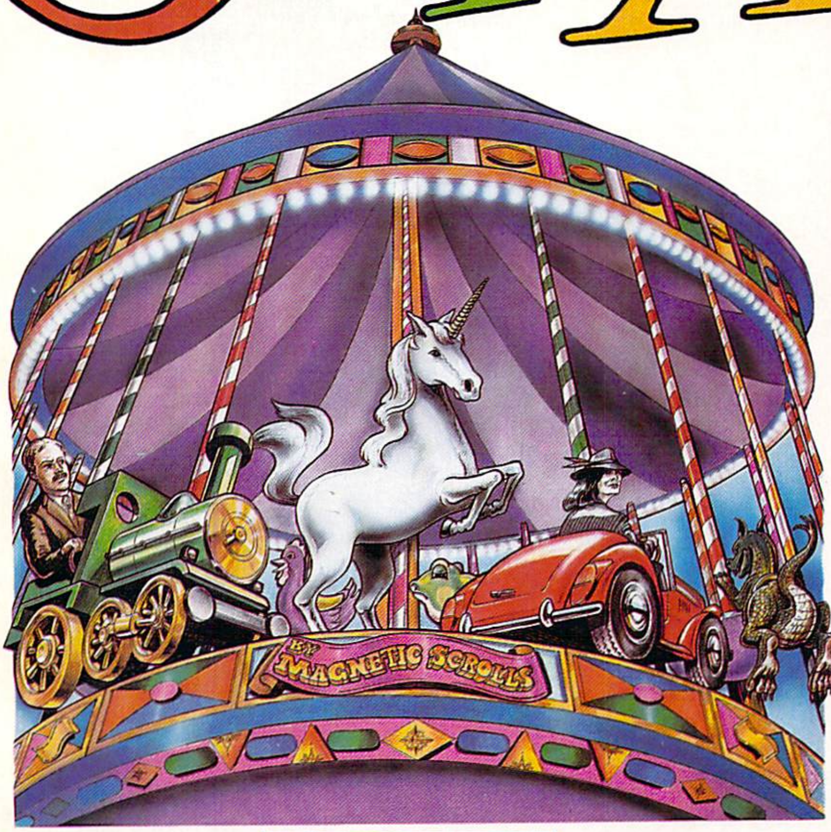
Escape Sequence Inc. has released **PhotoSynthesis**, an image processing program for the Amiga family of computers. **PhotoSynthesis** contains over forty basic image processing operations. The program requires 1MB of RAM, and 2.5MB is recommended for professional use. For more information contact: Escape Sequence Inc., P.O. Box 1101, Troy, NY 12180. Phone: (518) 274-1547.

Cartwright Joins Accolade

Veteran game designer Steve E. Cartwright has been named senior designer for Accolade, Inc. Cartwright previously held the same title at Activision, Inc., where he was responsible for creating best-sellers like **Hacker I** and **II**, **GeeBee Air Rally** and

Continued on page 12

JinXter



The funniest computer game since Hitch-hiker's Guide to the Galaxy.™

Enter the world of Jinxter, a challenging and hilarious graphic/text adventure from the folks who did The Pawn and Guild of Thieves. This time we decided to try something a bit different. A bit bizarre. Something to make people laugh while they tear their hair out. Sounds crazy, right? Good.

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Jinxter. You'll get widdled on. And love it.

Available now on Amiga, Atari ST, IBM, C64. Coming soon on MAC, Apple II*

*Text only.

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RAINBIRD

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Magnetic Scrolls

Telecom Soft, P.O. Box 2227, Menlo Park, California 94026.

Continued from page 10

Aliens. Cartwright will be responsible for coordinating all aspects of the creation and development of new games for Accolade.

Computing Experimental

Fischer America will introduce a new computing construction kit—**Computing Experimental** for the Commodore 64 and Amiga. The kit comes with a comprehensive guide which introduces the user to programming machines and robots. **Computing Experimental** facilitates exploration of motors and switches, switching with light, measuring and adjusting temperatures and methods of artificial intelligence. The kit, which retails for $379, includes interface, software and power supply. For details contact: Fischer America, Inc., 1904 Oostburg Ct., Modesto, CA 95356. Or call: (209) 575-3445.

Weekly Reader Lab-Packs

Optimum Resources, Inc. has released **Lab-Packs** for its entire line of Commodore 64-compatible Weekly Reader Software. The **Lab-Packs,** designed for in-school use, provide multiple disks with one set of documentation. Curriculum covered includes math, reading, language arts, science and utilities such as drawing, printing and music for children in pre-school through junior high. **Lab-Packs** are available at a retail price of $75. For further information contact: Optimum Resources, Inc., Station Place, Norfolk, CT 06058. Or call: (203) 542-5553.

Pro Video Plus

JDK Images has introduced **Pro Video Plus**, a character generator for the Amiga. The program runs in hi-res graphics mode and includes four fonts in four sizes as well as italics and multi-color effects. **Pro Video Plus** lets you import IFF graphics and digitized images as backgrounds. Real-time page transitions include rolls, slides, wipes, compress/expand, or custom transitions. JDK recommends that you have a minimum of 2MB Fast RAM. Suggested retail price is $299.95. For more information contact: PVS Publishing, 3800 Botticelli, Suite 40, Lake Oswego, OR 97035. Phone: (503) 636-8677.

Amiga 500 Command Center



The **Amiga 500 Command Center** is now available from Ketek, Inc. to house your Amiga 500 drives. The **Command Center** can accommodate two 3.5-inch external drives or one 3.5-inch drive and a 20 or 30MB hard drive. The unit features a built-in cooling fan, surge suppression, noise filter and five-outlet power strip. The **Amiga 500 Command Center** retails for $179.95. For more information contact: Ketek, Inc., P.O. Box 203, Oakdale, IA 52319. Or call: (800) 626-4582.

Compiler Companion

Lattice has introduced ten utilities to increase Amiga programmers' productivity. **Compiler Companion** provides a complete programming environment no matter what language is being used. The program combines the CXREF, LMK and Text Management Utilities that Lattice previously offered separately to take up less memory and execute faster. **Compiler Companion** has a suggested retail price of $100. For more information contact: Lattice, Inc., 2500 S. Highland Ave., Lombard, IL 60148. Or call: (312) 916-1600.

3.5″ Disk Transport

Totem Technologies has introduced a **Disk Transport** system to accommodate up to 250 3.5-inch diskettes. Removeable partitions in the case allow you to carry your 3.5-inch external drive (and up to 130 diskettes) or letter-sized documents (and 65 diskettes). The versatile **Disk Transport** is available for $39.95 (plus $3.50 shipping/handling) from: Totem Technologies, P.O. Box 374, Pinson, AL 35126. Phone: (205) 856-2437.

PURE-STAT BASEBALL™



From **Software Simulations** comes an incredibly sophisticated, realistic, and complete statistical baseball simulation for zero, one or two players. Game play, manager's functions, graphics, and a complete statistical library establish Pure-Stat Baseball™ as the ultimate sports simulation program.

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Built-in manager's functions provide extra versatility. The Trading function gives you the opportunity to create the "what if" team(s) you've always dreamed about. With this function you can have Dwight Gooden playing with Mickey Mantel and Babe Ruth. Or, if you like, you can form your own draft leagues from existing teams and play against your friends for your own pennant and World Series.

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An optional Stadium Disk is also available that lets you play in any of the twenty-six Major League stadiums.

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Lou Sander's Tips & Tricks

Compiled by Louis F. Sander

This month we feature short programs you can run on your 64 and/or 128. There are games, utilities and sound effects, plus several programs to do interesting things with the screen display.

As you may have noticed, we're very attracted to short programs. In fact, we're announcing a contest to find the best such programs for Commodore machines. To enter, send your best creations to the address below. Here are the rules:

- Screen listings must fit on a single 40-column screen which also includes the READY prompt. Shorter listings are acceptable, but longer ones are not.
- Entries must be postmarked before July 1, 1988, and envelopes must be plainly labeled "Programming Contest."
- Entries must include a program copy saved to disk, a printed listing, and a maximum of one page of instructions or explanations. Multiple entries may be recorded on one disk. (Sorry, but due to processing considerations we can't acknowledge your entry or return your disk).
- Names of the program and author must appear in the first line.
- Unless space considerations disallow it, DATA statements should have three digits per entry and eight entries per line, with line numbers less than 100.
- Programs will be judged on usefulness, beauty, craftsmanship, originality and general ingenuity. Documentation counts. Decisions of the judges are final.
- First prize is $100. Second prize is $50. The top ten entries will be published in this column late in 1988.

Send your contest entries and your other Tips & Tricks to:
Louis F. Sander
Post Office Box 101011
Pittsburgh, PA 15237

64 Potholes: In this very small but exciting program, you're an unfortunate driver who's stumbled onto a highway awaiting major repairs. Being the wild and crazy guy that you are, you floor your white sports car and attempt to avoid the potholes. If you hit one or go off the road, the excitement is temporarily over.

Good Luck and Happy Motoring!
Brett Kapilik
Winnipeg, Manitoba
Canada

```
100 PRINT"[CLEAR,WHITE,SPACE2]
    64 POTHOLES - USE JOYSTICK IN
    PORT 2":POKE 53281,15
110 V=53248:POKE V+21,1:POKE 2040,13
    :FOR J=0 TO 41:READ K:POKE 832+J,K
    :NEXT
120 PRINT"[CLEAR]":TI$="000000"
    :IF PEEK(V+31)=1 THEN 120
    :FOR J=1 TO 6:PRINT SPC(40):NEXT
130 X=155:Y=59:POKE V,X:POKE V+1,Y
140 POKE V+21,1:FOR Z=1 TO 5
    :PRINT"[GREEN] [CMDR +11,YELLOW,
    CMDR C,SPACE14,CMDR V,GREEN,
    CMDR +11]"
150 IF PEEK(56320)=123 THEN X=X-15
160 IF PEEK(56320)=119 THEN
    X=(X+15)AND 255
170 POKE V,X:NEXT:IF PEEK(V+31)<>0
    THEN POKE V+21,244:GOTO 190
180 P=INT(RND(0)*13)+13
    :PRINT"[UP]"TAB(P)"[BLACK,SHFT Q]"
    :GOTO 140
190 PRINT"[DOWN,SPACE6,BLACK]
    POTHOLES - BY BRENT KAPILIK"
    :PRINT"[DOWN] YOUR SCORE= ";TI$
200 IF TI$>HS$THEN HS$=TI$
210 PRINT "[SPACE3]HI SCORE= ";HS$
    :FOR J=1 TO 3000:NEXT:GOTO 120
220 DATA 0,0,0,1,254,0,3,3,0,3,3,0,3,
    255,0,1,254,0,1,2,0,1,2,0,1,2,0,1,
    254,0
230 DATA 3,255,0,3,255,0,3,51,0,1,254,
    0
```

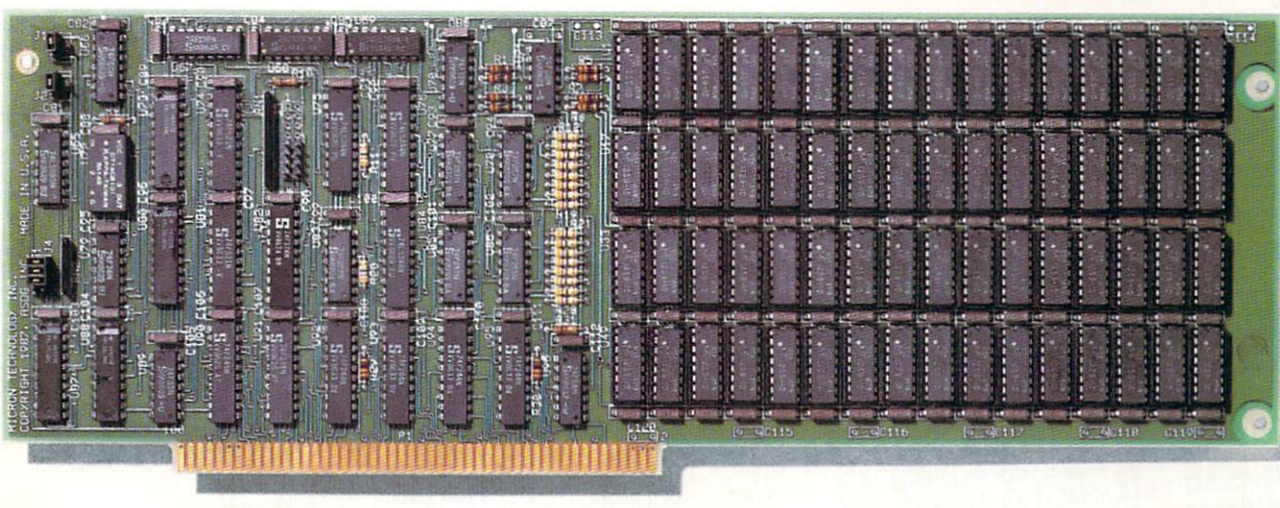
128 Evasion: Here's a nice game for the 128, with lots of action in very few program lines. Use a joystick plugged into port 2 to move your ship from side to side. You die when you collide with one of the meteors, but only for a few seconds.

If you're not yet a computer expert, you can use simple programs like this one to improve your programming skills as well as your piloting ability. A simple challenge would be to try adding statements to improve the colors on the screen. You have several to work with—border, background, titles, your ship and the invaders. Another challenge would be to add sound effects when a collision takes place, and/or to make the program keep track of the high score for the game.
Jose M. Miranda
Jayuya, Puerto Rico

Continued on page 108

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AMIGA Tips & Tricks

Compiled by Tim Jones

Each month we offer a series of tidbits, teasers and short programming examples. If you have an item you would like to submit, send it to:
Commodore Amiga Tips
651 Outrigger Dr.
Deltona, FL 32738

If we use your hint, tip or short program example, we will pay you between $10 and $50.

First, a credit and correction: Back in November we published a tip concerning the DATE function. At that time, the author was unknown to us. I have just received a letter from the author, Ali Ozer from Stanford, CA, who tells us we somehow left out the quotes from the command. The version published was: run date <CON:452/12/180/21/DD-MMM-YY HH:MM > NIL: ? However, it should have been: run date < "CON:452/12/180/21/DD-MMM-YY HH:MM" > NIL: ? The space in the window title would cause the HH:MM portion to be excluded without the quotes. Thanks for the great tip and update, Ali.

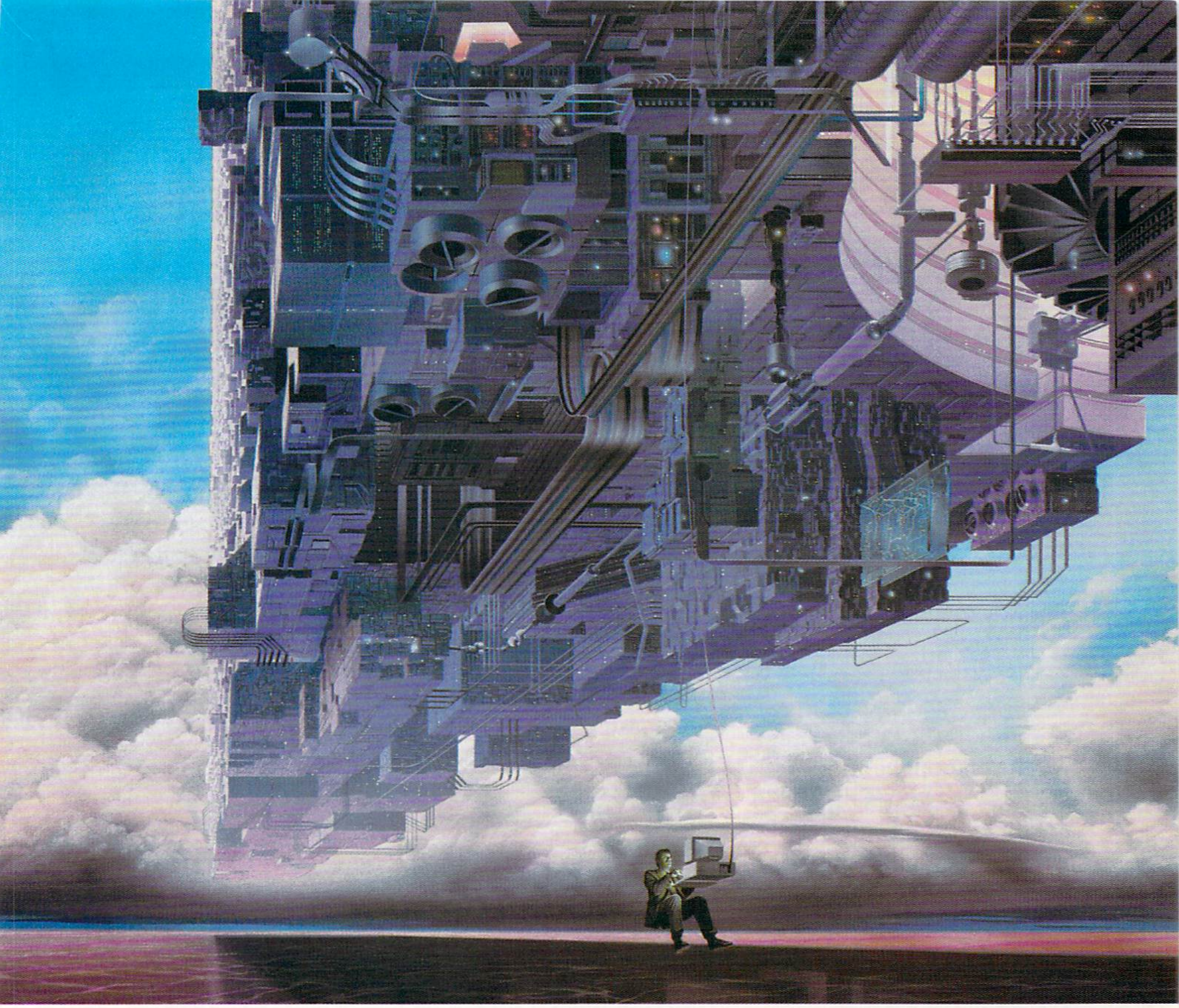
Softwood *File II* Bug Found: (on some disks, it may be MiAmiga *File II*): If you select PAGE SETUP from the PRINT menu while the form is in view, you may specify the print environment options for labels to be printed. At the bottom of this requester are two gadgets to exit the requester. One is labelled "OK" and the other is labelled "CANCEL." Therein lies the bug: neither gadget senses a click over its whole surface. Only the right-most eight pixels of the OK gadget and the white space between the left edge and the "C" of CANCEL are active.
Len Renoux
Colorado Springs, CO

***Barbarian* Frustration Ender!** Okay, Barbarians, are you tired of working up to a level only to be creamed by some unexpected creature? Well, there is a way to get past *every* creature you come up against. Simply click on the PICK UP gadget just before the creature or creatures are upon you, and you will disable the collision trapping so they will pass right through you. I have found that this works for every monster, even the dragon. It also works with many traps. Hope this helps those of you stuck in the world of the *Barbarian*.
Mike Czynkun
Denver, CO

Hayes-Compatible Modem Tip: Many of the terminal packages on the market rely on the built-in timer of your smart modem to control the time that it will wait before it decides that there was no answer on the receiving end. If your PBX system or long distance service causes delays in the time it takes you to connect, you can extend the time the modem will wait by tacking commas onto the end of your number. For example, if you were calling a number that required 40 seconds for an average connection, you could change the time the modem allows by adding two commas like this: ATDT 1234567,, This adds ten seconds to the delay time that the modem allowed for a connection. (Each comma represents a five second delay on most modems.) Also, if you have to dial a 9 and then wait for a second dial tone, you can do this by using an ampersand (&). The call above would then look like this: ATDT 9&1234567,,
Steven Jones
Savannah, GA

An Amiga, its 68000 and the GURU: For many of you who may own early Amiga 1000s, there may be a chance that the 68000 in your machine isn't operating at 100%. A small group of Amiga owners in Florida noticed an undue number of undecipherable GURU errors showing up on older machines (most of which were pre-June 1986 machines). One of the machines got to the point of not being able to function when any peripherals were attached to it (printers, external drives, memory, etc.). This one was sent out for repair, and it was determined that the 68000 was bad. When the unit was returned, the problems had all disappeared. When the 68000s in the other machines were replaced with 68010s, once again the GURU errors ceased. It seems that the older Motorola 68000-8 chips were the only ones with problems. If you are seeing unexplainable GURU errors and have an older 1000, it might be worth your time to have the 68000 replaced.
Kent Gunn
Deltona, FL

Continued on page 80



AT BERKELEY
NG PROCESS!

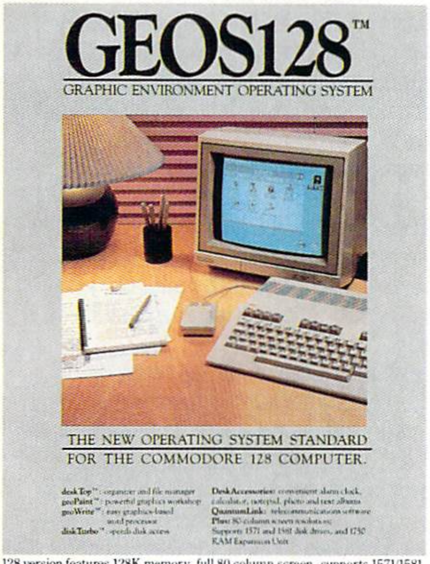
Avoid Old Age Forever!

But how does all this affect your Commodore's future? Well, it means you don't ever have to worry about it becoming obsolete, because there are all kinds of GEOS applications for almost every purpose.

You can finally get organized with geoFile, the database that searches, finds and lists almost anything that you want to search, find and list. You can manipulate mathematics or figure out financial formulas with geoCalc. If writing's your style, geoWrite Workshop can help you hammer out any kind of report. And geoPublish is the desktop publishing program that is still making headlines throughout the entire industry.

Of course, that's merely a sampling of what the GEOS environment has to offer. Because even as you read this, legions of our engineers are hard at work, developing even more GEOS applications for even more uses.

All of which means you get a whole lot more out of your Commodore than you ever bargained for. And while that may not actually keep your Commodore from getting older, that's certainly something it could live with for a long, long time.



128 version features 128K memory, full 80 column screen, supports 1571/1581 disk drives. 1750 RAM expansion and runs at a full 2 MHz for lightning speed.

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GEOCALC 128

NEW The GEOS-compatible, number-crunching spreadsheet for tracking and analyzing numerical data. Create your own formulas, perform calculations for anything from simple geometry to "what if" cost projections. 128 version features full 80 column screen. Due soon!

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Reviewed by Russ Ceccola

Beyond Zork

Computer: Commodore 128
Publisher: Infocom, Inc.
125 CambridgePark Drive
Cambridge, MA 02140
Medium: Disk
Price: $44.95

Bold moves can meet with either success or failure in the entertainment industry. As one of the first feature films to use color, *The Wizard of Oz* became a classic. However, recent attempts at box office success by using stars of the past proved disastrous in *King Kong Lives* and *Jaws: The Revenge*. The computer and software industry is also susceptible to such laws of chance.

Last October Infocom held their breath in anticipation of audience reaction as they released their most innovative work of interactive fiction ever, *Beyond Zork,* which combines interactive fiction, an enhanced user interface and a role-playing element that assigns seven attributes to each character you create for the game. What the Cambridge-based company didn't realize is that they would be releasing the most addictive, playable and challenging adventure of the year, the success of which will last into 1988 and beyond.

Beyond Zork's uniqueness lies in its interface between the computer and its user. The game takes full advantage of the processing power, keyboard layout and peripherals of every computer for which it has been translated. In the Commodore 128 version, you can use the keypad for movement and the function keys as substitutes for commands, and you'll marvel at the intelligent use of windows and graphics capabilities.

Game implementor Brian Moriarty remarked, "The reason for the interface is to use the full power of the machine as well as to make *Beyond Zork* easier to play. One of the two best-looking versions of the game is the Commodore 128 version. It has good color, graphics use and full support from the machine."

At the start of the game, an introduction is given which details a conversation between the Guild of Enchanters, in the form of lizards, newts and salamanders, and Y'Gaell, a woman wise in the ways of the Zorkian universe. She describes how someone must be sent out on a quest in search of the fabled Coconut of Quendor,



" 'More *Zorks*!' is all we ever hear from our fans—it's the most suggested theme for a game."

which contains all of the wisdom of the Age of Magick and is guarded by the Implementors deep underground. The Coconut must be recaptured so that the knowledge it contains will last beyond the Age of Magick, beyond the Age of Science and beyond *Zork*. That someone is you.

What you don't realize is that you must use all of the knowledge that you accumulate in *Beyond Zork* to achieve your goal. Although playing previous games in the Zorkian universe, which include the three *Zorks*, the three *Enchanters*, and *Wishbringer*, is not at all necessary, you will more thoroughly enjoy all of the innuendos, characters, objects and places in *Beyond Zork* if you have. When asked why he decided to do *Beyond Zork,* Moriarty replied "We thought it was time. We hadn't done a *Zork* in five years (it's been that long since *Zork III*) and hadn't visited the Zorkian universe since *Spellbreaker*. 'More *Zorks*!' is all we ever hear from our fans—it's the most suggested theme for a game."

Beyond Zork takes place in the Southlands of the Kingdom of Quendor. This region of the Zorkian Universe is a place "mentioned many times, but never actually visited in any of the *Zorks* or *Enchanters*," reported Moriarty. The game takes place at the same time that the character in *Spellbreaker* is going off in search of the white cubes and toward the end of the Age of Magick. Magic is losing its power and there are a lot of, as Moriarty put it, "scared enchanters who have been turned into reptiles wondering 'Now what are we going to do?' "

It's not for the enchanters to worry about any more, for you are the one who must undertake the quest for the Coconut of Quendor. Moriarty told me "The Coconut is an old joke around here. It's mentioned in *Spellbreaker* on one of the cards and in *Wishbringer* in the poem." To help you in your quest are an assortment of features implemented by various keys on the Commodore 128, as well as a set of new commands. Also, an on-screen map using boxes as locations shows the places closest to you and the direction you must move to get to them, by using lines to connect the boxes.

The on-screen map proved to be the most useful feature for me in playing *Beyond Zork*. I didn't have to spend time to draw out a map and instead wrote down only important pieces of information, such as what a magic item did or how much it was worth. Although Moriarty was happy that I found the map so useful, he told me his original intention: "The map wouldn't be used as a substitute for, but instead as a guide to, mapping the game. It shows the exact spacial relationship of locations in the game. The map seems to be the most-liked feature of the new interface, and I'm glad that people have found it easy to use. I designed it to make the job of the die-hard adventuring mapmaker easier."

In addition to the on-screen map, *Beyond Zork* contains a lot of features never before collected in one entity. The Commodore 128 version allows the use of the numbers one through nine on the keypad as the directions of the compass, with the number five used to go up or down. The eight function keys can be defined to execute a command or group of commands when pressed. I found that because there are not really eight function keys, but four dual-purpose keys, it is best to define the most-used commands for the odd-numbered keys which don't require the use of the SHIFT key.

An assortment of new commands lets the player vary the conditions under which *Beyond Zork* can be played. COLOR allows you to change the colors of the screen and characters. DEFINE accesses the function key defining screen. MODE allows players to toggle the enhanced window-using screen and the normal, all-text formats in which to play the game.

MONITOR toggles the option to display the character's endurance in battle. NOTIFY toggles the option to display when character attributes change. SETTINGS accesses the screen that displays more game options, such as producing a transcript of the game on your printer or receiving shorter descriptions of locations.

STATUS displays all of the character attributes. ZOOM switches between two views of the on-screen map: a more detailed version with a smaller number of "rooms" and a version that depicts more locations in the same screen area—in effect, zooming out from the first view. PRIORITY lets you choose whether you always want the inventory or attributes of your character to appear on the screen. NAME is one of the neatest commands in that it allows you to give a new name to objects and characters. This command is one of my favorite parts of *Beyond Zork* and allowed me to kill off many an enemy by renaming the monsters (i.e., "Tipper Gore" the hellhound.)

Another major element of *Beyond Zork* that makes it so successful is use of attributes/qualities for your character, in an attempt, as Moriarty stated, to "attract the role-playing people to interactive fiction. Instead of having just one score, you have seven, and you have to balance these different attributes, much like in a role-playing game." These attributes are: Endurance, Strength, Dexterity, Intelligence, Compassion, Luck and Armor Class.

By performing various actions in *Beyond Zork,* these attributes rise and fall. You must, in the course of playing the game make these attributes as high as possible in order to face the greater challenges of the game. Typical of Moriarty's humor, which permeates the game from the cover of the box to the finale, is the reduction of your Intelligence by a point if you use any "four-letter words."

Yet another unique aspect of *Beyond Zork* (how many can there be?) is the use of randomly-generated geography and objects throughout the game. Each game is different because of this randomness, contributing to *Beyond Zork*'s high replay factor. Different areas of the game are generated right before entering them and various items are given different names, so another part of playing *Beyond Zork* involves finding out what these objects do and navigating this changing terrain. Don't restart a game from the beginning, because then all of the maps you've drawn and uses of objects you've found will be useless.

Moriarty commented, "Randomness was an interesting experiment. It split the old-timers who liked static adventures and the newcomers who like the degree of mystery in what comes next in the game. If I would do it again, I would make the game more random. Before you enter certain areas, they don't even exist. The monsters are smart, once the geography is generated, they run around in it."

Beyond Zork offers a lot to the adventurer. Because of the size of the game, you can wander for hours, getting acquainted with the Southlands. Moriarty offered, "You can play *Beyond Zork* as a role-playing game, a magic-oriented game, a hack-'n-slash game or an exploring game or simply try to reach the end of the game. There are also whole planes of reality in *Beyond Zork.*"

Included in each *Beyond Zork* package is a handsomely-illustrated book entitled *The Lore and Legends of Quendor* as well as a meticulously-drawn map of the Southland of Quendor. The book is necessary to finish the game, because of all the information it contains about various characters and objects, such as spenseweed, Pheebor, the ur-grue, the monkey grinder and the dust bunny. Commenting on the new characters in *Beyond Zork,* Moriarty said, "The two favorites of players are the monkey grinder and the cruel puppet. A personal favorite of mine is the cruel puppet."

Because of the vast number of places, objects, monsters and characters, I won't spoil them by describing them to you. I'll let you find them out for yourself. There are simply too many to touch upon in a review of this size, but suffice it to say that you won't be disappointed by *Beyond Zork,* an adventure in the classic meaning of the word. If you think that *Beyond Zork* may be too challenging or too simple, let some words from "Professor" Moriarty put you at ease: "I was frantic that I wasn't putting in enough puzzles until one day it dawned on me that I had put in far too many. However, there is a good mix of puzzles—hard ones like the arch puzzle and easy ones like the amulet puzzle."

Beyond Zork may just have set a precedent in the software industry for adventures of all kinds, text and otherwise, because of its dependence on a strong story with captivating elements that uses both the creativity of the player and the computer it is played on to come to life. If you call yourself an adventure game fan, *Beyond Zork* is a must. After having played five different *Beyond Zork* games and annually replaying the *Zork* series like most others reread certain books, I can honestly say that it is destined to become a classic. Moriarty spent exactly one year and three days in readying *Beyond Zork* for a discriminating world. His careful work is evident throughout the game and must be experienced to be believed.

Hints

These are some hints on how to play *Beyond Zork*—a guide written in hindsight after playing *Beyond Zork* for 40-50 hours. If you follow these tips, your stay in the Southlands of Quendor will be more enjoyable and less tedious:

- Kill the eldritch vapor in the Moors first. He steals items, and if you haven't killed him you'll become quickly annoyed every time you go through the Moors.
- Write down what each item is worth to the old women in the shops. Separate them into magic items, weapons and clothes/miscellaneous for easier game play and instant reference.
- The higher your intelligence, the easier it is to determine the name that activates a particular scroll or potion. Keep this in mind in creating a character.
- There are a lot of unusual and different creatures that you'll meet in *Beyond Zork.* Some include: giant spider, slug, guttersnipe, giant bloodworm, crocodile, hellhound, rat-ant and most of the creatures in the book. Some are friendly, some are out for blood. Two or more are usually guarding a certain location together. Some example groups are: eldritch vapor/guttersnipe, rat-ant/discipline crab/skeleton, cruel puppet/hellhound, bloodworm/crocodile, and giant spider/slug/dust bunny/dorn. Each creature has its own peculiarities. Figuring them out is half the fun.
- While in battle, if your endurance is very low and you have an escape route, run and wait somewhere safe until your endurance is back to normal. Only then should you try to attack the creature again. Otherwise, save the game and keep on restoring and fighting until you kill the monster.
- In every game you play, the scrolls, potions, stave/stick/staff-type objects and other magic items have different purposes. Take them to the old woman in the Magick Shoppe as soon as you can to find their purposes.
- You need greater dexterity to get some-

Continued on page 105

by Gary V. Fields

Druid

Computer: Commodore 64
Publisher: Firebird, Inc.
Distributed by:
Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $24.95

If you are ready to test your reflexes and mental toughness against still another evil force bent on destroying the good in this world, welcome to *Druid*. The storyline is familiar: Evil powers have taken over the land. You and you alone must defeat the dark side and make the world a safe place for babies to sleep again. As a *Druid*, you can summon magical forces to advise you, the question is which magic is stronger—yours or that controlled by the evil Acamantor?

The screen is divided into two windows, the larger one displays the playing field, and the other shows your character's conditions. The playing field shows an overhead view of your character (a robed, white bearded, monk-like fellow), his surroundings (trees, dungeons, doors, bridges, water) and the approaching evil forces (ghosts, beetles, skeletons, devils, slime). The conditional window shows which spells are available, which keys and special tricks you have, and the life span of your character. All of this is done with icons. I enjoyed the humorous life gauge which is depicted as a piece of rope. In *Druid* when you "near the end of your rope" there is no question as to what the phrase means.

Although *Druid* has the attributes of an adventure game (you must find and use items scattered among the dungeon's levels), it is played at arcade speed. You move your Druid around the playing field as you would an arcade character, and when the fire command is given, the magical spell is cast in the direction the character is facing.

To finish your quest, you'll have to master five different spells: water, fire, electricity, invisibility and chaos. You'll also have to collect and properly use dozens of keys, plus employ the assistance of a Golem—a robot-like creature which will fight your battles for you. On the evil side, you have to battle your way through eight levels of bad guys which get progressively tougher. On level one you'll face ghosts which can easily be defeated with water bolts. But at the end of your journey you'll face skeletons, slime and devils which require strong, less-easily attainable magic.

Although *Druid* can be controlled by either the keyboard or joystick, I found the former suicidal. My brain just doesn't associate upward movement with the "]" key, used to go up on the screen. But because the keyboard must be used to select magical spells, joystick control has its flaws too. Thus I started playing the game with a joystick and used my little finger to press the key to cycle through spells. Recently I bought one of Suncom's computer-mounted joysticks which frees one hand to control the game and the other to choose spells.



LAURIE CUMPSTON

The game's graphics are well defined and the musical scale which played before action begins adds to the atmosphere. Once play is begun the only sounds you'll hear are those produced by your Druid moving and the sound effects caused by his contact with evil forces or the effect of his spells.

It's always easier to show a game than describe it with words. If you can imagine a game which is half *PacMan* and half *Zork*, you have a good idea of what *Druid* is like. Your character must traverse mazes created by trees, hedges and dungeon walls while being endlessly chased or trapped by the evil forces of Acamantor. But during your travel, you must collect and use the objects and spells you find just as you would in the *Zork* adventures. But unlike a text adventure, *Druid* doesn't require any typing at all, unless you decide to control your character with the keyboard instead of the joystick.

Druid breaks no new ground in either the arcade or adventure field of software. While I don't think *Druid* is the ultimate arcade/adventure, it is entertaining and challenging. It has special effects and unique twists which make it a game worth playing. The game is neither too easy nor overly difficult to play and master. It creates a sensible frustration level which makes you vow to yourself, "I'll get it next time." That's how a good arcade/adventure game should make you feel and *Druid* succeeds.

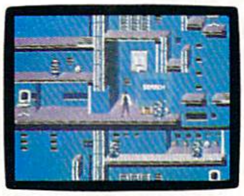
Hints

- This is a tough game. To win you must be quick with your joystick; you'll have little time to plan your strategy while battling the never-ending horde of evil opponents. But each time you approach a chest, the game stops until you choose an item to take. Use these delays to catch your breath and think—as soon as you select an item you will once again face Acamantor's attackers. You can also pause the game by pressing the RUN/STOP key, but I've found the split second it takes me to move my hand to that key is often more time than it takes a ghoul to attack my character.
- Because you'll need special keys to unlock the doors of the dungeons, be sure to take every key in the chests you find (and don't leave any chest unopened). The only time to pass a key is to choose Golem—a protective creature who will accompany you on your travels.
- As soon as you banish one creature others materialize. So to minimize the number you must face, hold your fire until the creatures are close. Not only will your fire be more accurate, but you can also move further before having to face another. C

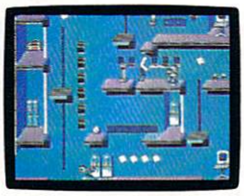


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Of course, Elvin's floor plans are almost as complicated as his global plans.

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IMPOSSIBLE MISSION II

BY EPYX®

Commodore 64, IBM & compatibles, Atari ST, Apple II & compatibles, Amiga



by Gary V. Fields

Top Fuel Eliminator

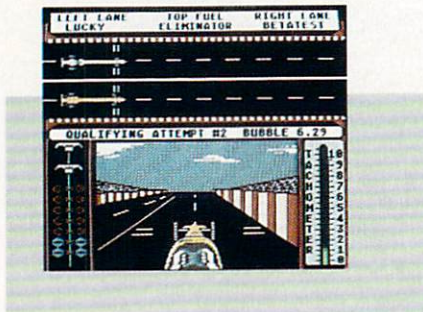
Computer: Commodore 64
Publisher: Gamestar/Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $29.95

Top Fuel Eliminator accurately simulates a full season of drag strip racing. It recreates every important ingredient of rail racing—leaving out only the smell of burnt rubber. Thus, it is a game true race fans should love. It puts them in the cockpit of a nitro-methane powered super rail with the "Christmas tree" lights counting down. But if you approach this game looking for arcade kicks you'll be disappointed—while the action is fast, fine tuning your racer is far more important than wrist action on the track.

Drag racing is the fastest, most specialized, four-wheel competitive sport in the world. But the actual race lasts only a few seconds, and the variables which determine who will capture the checkered flag are usually decided before the racers roll to the starting line. Those facts hold true with this simulation. While it is important to be able to control your car, know when to pop the clutch and the exact split-second to shift gears, knowing your car's capabilities and how to squeeze the most out of the 2500 horse power engine you are riding is paramount.

Most races are lost or won in the pits, preparing the car. To compete you must understand and be able to perfectly mix the variables (clutch adjustment, tire pressure, fuel mix, etc.) to get the maximal performance out of your engine and the perfect downward force to increase your traction for the specific track and the day's atmospheric conditions. In the real racing world, determining and mastering all these variables requires years of experience. And the only way to acquire that experience is to get on the track and race. The same is true with *Top Fuel Eliminator*—to win you'll have to try different setups and race, race, race.

The game is divided into two modes—"Practice" and "The Racing Season." The options possible in both modes are the same, but in the Practice mode you race against a clock under the same conditions as another driver. During the Racing Season you compete head to head and heat to heat against the sport's best drivers, through an entire nine-event season. The program lets you squeeze a full year of racing into less than half an hour.



While the action is fast, fine tuning your racer is far more important than wrist action on the track.

Before you roll up to the starting line, you must fine tune your racer. This means, just as in real racing, you must know the track's temperature, humidity, elevation and traction condition. After digesting that information you must set the car to get the maximum performance. Different track conditions will determine how you adjust your ignition timing, fuel mix, clutch, tire pressure and supercharger speed. While making these adjustments is easy—you just select an icon and alter the settings with a joystick—getting the right settings for each track's condition requires experimentation and good judgement. If you know nothing about the requirements for drag racing competition before you boot up *Top Fuel Eliminator*, you must learn quickly or eat a lot of dust trying.

After the car is ready, you select the "Christmas tree" icon to bring up the racing screen. This realistic display gives you a three-dimensional view from the cockpit of the racer as well as a second overhead view of both your car and your opponent's. I liked this split view because it allows you to view the race as a driver or spectator. On the left of the cockpit are the starting lights (counting down from yellow to green), and on the right is a tachometer gauge. In the pits you prove your mechanical skills, here you must prove your driving skills.

In drag racing if you blink—you lose. The same is true here, because a race generally lasts less than eight seconds. Unless your reactions are split-second perfect, the race is lost as soon as it begins. To win with *Top Fuel Eliminator* you must pop the clutch just as the green lights appear and shift gears just before your engine blows—just like the real-life racing the game simulates. Failing to be perfect in any category results in your either being left at the starting line, blowing an engine or worse yet—crashing in a ball of orange flames.

After each heat your performance and the car's are evaluated. During a season of racing, you compete against a dozen or so different drivers on nine different tracks beginning at the Winter Nationals and ending at the World Event. You don't have to win every race to win a season, but you must qualify on all and win more than a few. Anyone who has followed the circuit will feel very comfortable with this racing format.

Just as drag racing is not a sport for everyone, *Top Fuel Eliminator* is not a game for everyone. But if you find drag racing thrilling, if you enjoy juggling and testing variables to find the right mix and live for competition, you'll like this race simulator—it has all three. The game's graphics and sound effects accurately simulate the surroundings of a real race—when the engines roar, so does your monitor's speaker. The game's controls are easy to master and make the 12-page manual "optional reading only." Two pages of the document do give advice on how to win and should be read by anyone new to the sport or having trouble qualifying on the track.

There are two options missing from the game which would have made it better: (1) there is no provision for competing directly against another person, and (2) you can't save your position during play, so you cannot return and finish later. I was surprised the game allows only computer vs. human competition. The computer's "pro drivers" are not unbeatable, but they are tough. Since drag racing always involves one-on-one competition, I think the inclusion of a human vs. human option would have added both realism and fun to the game. Maybe that option will be added to a future update.

As it stands, *Top Fuel Eliminator* is a unique program, not a remake of some other game. It is perfect for the racing audience for which it was designed. Those who like drag racing will be thrilled; those who prefer other sports should look elsewhere for entertainment. ■



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by Jeff Seiken

Fall Gelb, Seventh Fleet, and Stalingrad Campaign

Computer: Commodore 64
Publisher: Simulations Canada
P.O. Box 452
Bridgewater, Nova Scotia
Canada B4V 2X6
Medium: Disk
Price: $60.00 each



It's impossible to review any of the war games published by Simulations Canada (SC) without commenting immediately on their most distinctive characteristic: none of SC's games have any graphics. Instead, they feature text-only displays and are played in conjunction with maps and counters.

Disappointing as this may be to gamers who love watching tiny tank and soldier icons scoot across the screen, SC's reliance on paper mapsheets and cardboard counters in lieu of graphics has much to recommend it. For one, a complete picture of the current game situation can be gained in a glance without the need to resort to any sort of scrolling function. Another significant advantage is that the paper maps are far easier to read than their computer-generated counterparts.

The duplicate sets of components included in every SC game also eliminate some of the awkwardness of trying to play a game against a live opponent. When one player is busy entering his orders into the computer, the other need not stare aimlessly into space, but can use the time to review the disposition of the counters on his copy of the map and plan his next move.

Other than the necessity of tracking the progress of the units across the map yourself, the mechanics of the SC's games differ very little from any other computer war game on the market. A series of menus prompts you through the orders phase, after which the computer still assumes the twin roles of rules enforcer and bookkeeper, as well as that of an opponent if solitairy play is desired. The process of physically moving the cardboard counters actually carries some psychological satisfaction, as it makes you feel more like a participant in the game and less like a mere observer.

The conjunction of computer and board game elements is a trademark of SC's products. However, gamers who have the opportunity to examine several of the company's titles will notice something more at work—call it a unifying philosophy. The thread that binds all of SC's games together is their emphasis on command and control.

The rule book in every SC game is careful to establish the viewpoints of the players (i.e., who the players represent) and this, in turn, defines their responsibilities. A natural outgrowth of this attention to viewpoint is the attempt each game makes to portray a commander's imperfect control over his own forces on the battlefield. How these ideas are represented in game terms will be described in detail in the capsule reviews that follow. In general, the focus on command and control makes for a refreshing and realistic change from other games where troops perform like marionettes, carrying out their orders with parade-ground precision.

Fall Gelb

To date, Simulations Canada has published more than a half-dozen titles for the Commodore 64. *Fall Gelb*, the company's first release, simulates Germany's whirlwind conquest of France in May and June of 1940. ("Fall Gelb" was the German code name for invasion.) Given the relative ease of the German victory, turning the subject into a game offering a challenging situation for both players would seem difficult. *Fall Gelb* resolves this problem by including a series of four options that either strengthen the French or weaken the Germans, in addition to the historical scenario.

The playing pieces in *Fall Gelb* represent corps-sized units and army headquarters. As the overall commanding officer of either the German or Allied army, you have the option of issuing orders directly to individual corps or indirectly through the parent headquarters of the corps. When exercising direct control, you are responsible for specifying the exact line of advance or retreat for the given corps, as well as the type of attack or direction of defense. Otherwise, you need only assign an objective to each army headquarters and it will then direct the corps under its authority to the best of its (i.e., the computer's) ability. This second option is a nice labor-saving device, as it

allows you to concentrate on the most important sectors of the front, while leaving battles of secondary interest to the direction of your subordinate commanders.

One of the cornerstones of the game system is the limit it places on the intelligence available to you about the status or even location of enemy units. Even after contact is made, you might only gain information about the identity of an enemy corps and still learn nothing about its combat strength. Historically, the Allied defeat was as much a failure of intelligence as one of arms, as Allied planners completely miscalculated the direction of the main German assault. *Fall Gelb* accurately reflects the importance of battlefield intelligence; success in the game hinges on your ability to gauge your opponent's intentions from the sketchy details available.

The game's emphasis on perspective and command-control shines through in the way your ability to direct your troops fluctuates with the situation in the field. As friendly corps become disorganized and their lines of communication with higher command disrupted, your control over these units is diminished. Orders might not be received, and in severe circumstances units might simply cease reporting their positions and "disappear" from the map.

As SC's pioneering effort, *Fall Gelb*'s mechanics can be somewhat cumbersome—a flaw not present in the company's subsequent games. In later designs, for instance, units are always identified by a one or two digit number printed prominently on the counter. *Fall Gelb*, however, relies on longer codes, such as "G26AK." The use of these unnecessarily complicated codes increases the time needed to type in orders and also adds to the possibility of making a mistake along the way. Some of the other procedures in the games also seem very slow. For example, the segment of the turn when the computer generates combat reports lasts upwards of five minutes and consists mostly of seemingly endless updates on air activity, information which is at best of marginal interest.

Fall Gelb's biggest drawback, however, relates back to the one-sided nature of the campaign it seeks to simulate. In order to balance the game, players will have to resort to one or more of the "what if" game options and, to my mind, a certain amount of pleasure is lost in the knowledge that what you are playing represents only a hypothetical version of past events.

Nonetheless, if you do not mind recreating history as it might have been, you will find *Fall Gelb* an intelligent and insightful study of this WWII campaign.

Seventh Fleet

Seventh Fleet explores modern naval warfare in one of the distant corners of the globe—the western half of the Pacific Ocean. The game casts you in the role of either the Soviet or American theater commander, and the units of command are an assortment of frigates, cruisers, destroyers, battleships and aircraft carriers.

Turns in *Seventh Fleet* are broken down into four segments. Most decision making occurs during the command segment. It is here that you form or reorganize task forces and assign each a mission and a destination.

The player's perspective as theater commander figures prominently in the game. Essentially, the different missions available are more like general guidelines issued to your task force commanders. How well each performs his allotted mission depends on his reliability in initiative ratings. A commander with a low reliability rating might modify or disregard a direct command, while someone with a high initiative rating would most likely react effectively to some unforeseen development. In this way, *Seventh Fleet* brilliantly incorporates an authentic sense of player viewpoint into the game, and with the same stroke accounts for the importance of the human element in warfare.

Seventh Fleet also mirrors the difficulties of controlling a fleet scattered over thousands of miles of ocean. Each task force has an EMCON rating, which is a measure of its electronic quietness. The rating decreases every time you communicate with a task force, thereby increasing its chances of detection by the enemy. The game thus presents players with the very real dilemma of balancing the need to maintain radio silence against the desire to monitor the activities of your ships.

Several intriguing wrinkles supplement the basic game system, adding an extra dimension of decision making to *Seventh Fleet*. The most ingenious is the fluctuating conflict level. The game actually commences with the two protagonists at peace and from there the degree of hostilities can escalate upwards through conventional warfare all the way to global nuclear warfare. At the beginning of every turn, you can recommend an increase or decrease in the conflict level, subject to the approval of your superiors in Washington or Moscow. Choosing when to breach the peace and, later, when (if ever) to resort to nuclear weapons will be two of your most critical determinations in the game. Of course, the possibility always exists that a task force commander with a low reliability rating might decide on his own to start a shooting war!

The Achilles' heel that very nearly hamstrings what is otherwise an excellent game is the deadly slow pace of play. Ironically, the process of entering orders is quick and easy, as at most you can have seven task forces operating in the game at once. Nonetheless, a full turn will average twenty minutes in length, with the great majority of this time spent waiting for the computer to respond during different segments. When you consider that ten turns might easily go by before war breaks out and a decision might not be reached for another fifteen or twenty turns after that, you will realize that *Seventh Fleet* can be a very long, drawn-out affair.

That the average playing of *Seventh Fleet* still manages to deliver plenty of excitement and drama is a testament to a fine game system that vividly captures the realities of modern naval warfare. Appreciating the game's many merits merely requires patience.

Stalingrad Campaign

Stalingrad Campaign focuses on one of the pivotal episodes of World War II—the 1942 German offensive that ended in disaster at Stalingrad. The game resembles *Fall Gelb* in a superficial way: counters represent combat units and their headquarters. Otherwise, *Stalingrad Campaign* features a much more streamlined game system—players will find that the orders phase progresses rapidly and the response time is also good.

Stalingrad Campaign's most significant innovation is in the role assigned to the headquarters units. As the Soviet or German Chief of the General Staff, you issue commands to individual combat units, but these orders must be processed by a unit's headquarters. The volume of orders that any particular headquarters can handle varies according to the quality of its staff. If you try to do too much at once, you run the risk of overloading the headquarters' staff, in which case the effectiveness of the troops under its command are reduced, and you will be prohibited from issuing any further attack orders to those units. Through this mechanism, the fighting capabilities of the different armies in the games are portrayed in a sophisticated

Continued on page 113

by Scott A. May

GeeBee Air Rally

Computer: Commodore 64
Publisher: Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $29.95

Pull back the throttle and strap yourself in—it's white-knuckle time in the unfriendly skies of *GeeBee Air Rally*.

This incredibly fast-paced arcade game invites you to climb aboard the GeeBee, a mere wisp of a plane with a heart of pure fire. The GeeBee was the most revered—and feared—racing plane of the barnstorming 1930s. Undoubtedly the fastest plane of its era, the GeeBee garnered several air racing championships, including the famous Thompson Trophy. It also lost the lives of many experienced pilots.

Activision has revived the GeeBee in a game that blends the hard-edged excitement of road racing with the graceful beauty of flight simulation. The result is a masterful tribute to the days of high-intensity video games. Grab a good joystick and prepare for excruciating hand cramps when you take control of this one. You'll love every second of it.

The GeeBee strips pilot controls down to a minimum: yoke, throttle, altimeter, speedometer and compass. These gauges are mere window dressing, however. During an actual race, the last thing you want to do is take a meter reading. The action is so fast and furious, turning your eyes away even for a second can be disastrous.

Despite its lofty appearance, *GeeBee Air Rally* really has its roots firmly planted in classic road racing games, notably Epyx's famous *Pitstop II*. The flat asphalt track is replaced by an airborne course defined by pylons. Each course snakes its way across a barren landscape. Rounding hairpin turns at full throttle produces the familiar pull of centrifugal force.

Unlike conventional road racing, however, players fly through each course racing the clock, not other pilots. There are other planes in the race, but these computer-controlled pilots are not interested in winning. Their only goal is to get in your way, and they do so with uncanny precision. Air traffic is initially light and can be out-maneuvered easily. At higher levels, the sky becomes congested with slow-moving planes severely limiting your movement.



> Rather than tagging behind or moving around other planes, players must learn to fly *under* and *over* approaching aircraft.

How you avoid the competition is what makes *GeeBee Air Rally* a truly unique racing game. Rather than tagging behind or moving around other planes, players must learn to fly *under* and *over* approaching aircraft. This action brings genuine 3D excitement to a familiar racing scenario.

Your worst enemy is something you have no control over: time. Players are given two tries to complete each course within a prescribed amount of time. A second failure ends the game. Excess time is added to the next race, giving added incentive to beat the clock. Unfortunately, the clock moves four times faster when you wander outside the pylon boundaries. At higher levels, even one such mistake may cost you the race.

Points are scored for covering ground during the race. Bonus points are awarded for finishing the race with time to spare. The fourth race on each level features either a balloon-popping contest or a slalom event for an even greater score. A Top-15 vanity board is provided at the end of each game for recording high scores to disk. This list may be cleared at any time by pressing the F3 key.

GeeBee Air Rally is a tough-as-nails game that definitely gets the adrenaline pumping. To ease the agony of defeat, designer Steve (*Hacker*) Cartwright has included some well-placed humor in the face of disaster. Colliding with another plane, for example, sends your video pilot tumbling to earth with some unexpected results. In one race he may land face-down in a pigsty. Another race might find him dangling from a tree limb. If you view these scenes too often, however, keep this in mind: you are probably losing the race.

Despite these humorous highlights, the game features graphics that are mediocre at best. This is surprising considering the graphic detail Cartwright exhibited in *Aliens: the Computer Game* and *Hacker II*. The foreground—a rear view of your GeeBee—is nicely drawn, but the background graphics are very blocky in appearance. The ground-level graphics are equally uninspired, consisting of endless rows of rapidly-moving horizontal stripes. The strobe-like effect accurately depicts a feeling of 3D movement, but it's an old visual trick. The 64 is capable of much more than this.

It should be noted, however, that the graphics in this game move at lightning speeds and are virtually *flicker-free*. This in itself is quite an accomplishment.

The purpose of *GeeBee Air Rally* is not for sightseeing. Arcade thrills demand tough play action, and this game delivers. Joystick control is incredibly tight and responsive. Staying within the pylons is a difficult task, especially as the course narrows and the curves sharpen. The standard rule of high-speed road racing also applies here: focus your eyes on the horizon and anticipate approaching turns. This technique also cures oversteering, a common problem for rookie pilots. If you fly beyond the pylons, quickly reduce throttle and bank sharply to get back on course.

As air traffic increases, flying above and below oncoming planes is unavoidable. A rhythm of climbing and diving will get you past the first difficult levels, but as the number of planes grows, their flight patterns become erratic. It is often possible to squeeze between two planes as you round a curve. This is accomplished by precise timing of your bank.

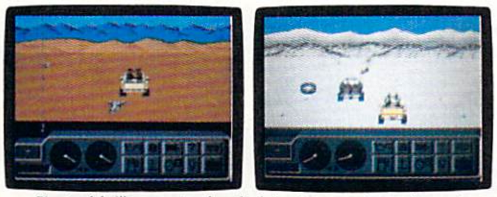
GeeBee Air Rally is a delightfully addictive arcade challenge with long-lasting play value. Speed demons—prepare to meet your match. ■

Editor's Note: *Activision has also released an Amiga version of this program.*



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BY EPYX

Commodore 64/128, IBM & compatibles, Amiga



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Q-Link SM

The Commodore® Connection.

by Bob Guerra

Super Sequencer 128

Computer: Commodore 128
(MIDI Interface Required)
Publisher: Sonus
21430 Strathern St., Suite H
Canoga Park, CA 91304
Medium: Disk
Price: $275.95

One of the hottest new peripherals available is the MIDI interface, a cartridge that attaches via cables to any MIDI-equipped music synthesizer. With such an interface you can send musical information back and forth between your computer and synthesizer. This information generally describes the quality of the sound being produced by the synthesizer, or the pitch and duration of the individual notes being played.

Of course, like any peripheral, a MIDI interface is only as useful as the software you use to run it. *Super Sequencer 128* is a powerful MIDI sequencing program for the 128 that works like a multi-track tape recorder. That is, it lets you record one track of music and then go back and, while listening to the original track, add additional music onto another track.

Up to eight separate tracks can be layered in this manner, and the resulting musical composition is a sequence. If you want to record additional musical data once all eight tracks have been used, any two tracks can be combined or "bounced" onto one, thus emptying a track for future use. Each of your final recorded tracks can be sent out over a different MIDI channel to control separate MIDI instruments and an additional signal can be sent simultaneously to drive an external drum machine in synchronized rhythm with the sequencer. Finally, entire songs can be composed by stringing together as many as 16 different sequences.

Super Sequencer works in the 128 mode and takes advantage of the 128's larger memory. Thus, the program lets you record almost twice as much musical data as similar programs for the 64. Although the program operates only in the 40-column mode, the main screen is a functional workplace that gives you everything you need to maintain control of your music at a glance. For example, always visible at the top of the editing screen is the amount

> *Super Sequencer* allows you to manipulate the recorded performance data in several different ways.

of recording memory remaining. Also shown are a listing of the sequences currently in memory and the tracks that have been recorded for each. Both the sequence being edited and the particular track being worked on are highlighted. Other indicators show the tempo and meter of the current sequence, as well as the status of several recording options.

When recording or editing a sequence, a digital counter shows the current measure, beat and pulse (each quarter note can be divided into 24, 48 or 96 pulses). Cursor keys are used like tape transport controls to advance or roll back the counter, or you can jump immediately to the beginning or end of a sequence using the CLR/HOME key. An audible click track serves as a metronome to help you keep the correct beat as you play. This click track begins as soon as you turn on Record, but you don't actually begin recording until you play your first note. This way you don't have to leave a big silent hole at the beginning of your sequence while you take a measure or two to get in sync with the counter. Similarly, when recording additional tracks, a count down feature lets you hear several beats to sense the rhythm before you actually begin recording.

Although the comparisons to a conventional tape recorder are inevitable, *Super Sequencer* is, in many ways, more powerful than a tape recorder because it allows you to take the performance data (not the sound) you've recorded, and manipulate it in several different ways. You can, for example, take a sequence that has already been recorded and adjust the tempo without affecting the music's pitch. Conversely, you can transpose your entire sequence into a new key without affecting tempo. If the timing of a performance you've recorded is less than perfect, you can "auto-correct" the timing of the notes you've played to the nearest quarter, eighth, sixteenth or thirty-second note as well as to the triplets of any of these note durations. Also, sequences or individual tracks can be shifted forward or backward in time for creative effect, or to compensate for the slight delay sometimes caused by sending some MIDI data through one instrument and into a second or even third.

Another way to improve on the original performance you've recorded is by re-recording or "punching in" over just that portion of a track where a problem is located. To do this you simply use your transport controls and counter to select a punch in point, a punch out point, and if you don't want to start playback at the beginning of the sequence, an optional cue point. By playing along with your original track during the time between the punch in and punch out points, your new performance data will replace the old. If a section of music you are trying to record is particularly difficult, you can always slow the tempo during recording, and then set it back to the proper speed during playback. The transport controls can even be used to manually advance the counter to record in "step mode" rather than real time.

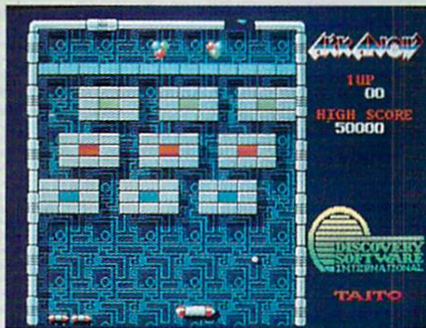
Super Sequencer 128 can be used with MIDI interfaces made by Passport, Yamaha and Syntech, and virtually any MIDI-controlled instrument. When used with synthesizers such as the Yamaha DX7 or Roland D-50 that are both velocity and touch sensitive, *Super Sequencer* will even record velocity and aftertouch data as well as modulation and pitch bend information. Because recording a MIDI performance in this much detail can quickly eat up a lot of memory, *Super Sequencer* lets you automatically filter out excessive aftertouch information or even strip tracks of any of these qualities individually, while retaining both timing and pitch.

The *Super Sequencer* owner's manual is similar to the program's on-screen display—well-organized and functional though not particularly slick. It guides you logically through the use of the program's main features and includes a number of appendices mapping out *Super Sequencer's* several menus and listing other "hidden" commands as well. Finally, for those of you who might already own a Sonus sequencer for the 64 such as the one packaged with the Personal Musician interface or the more advanced Glass-tracks and are thinking of upgrading to *Super Sequencer*, you'll be happy to learn that sequences created with these earlier packages can be used with *Super Sequencer*.

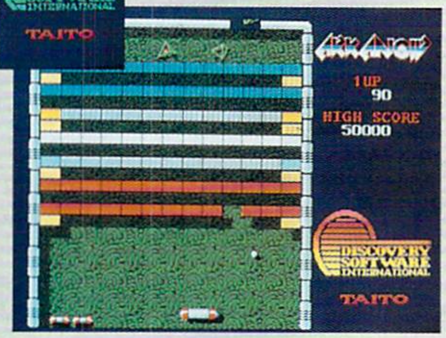
Reviewed by John J. Kottler

Arkanoid

Computer: Amiga
Publisher: Discovery Software International
163 Conduit St.
Annapolis, MD 21401
Price: $49.95







Once you've played one round, you'll want to continue until you've seen all of the screens!

You fold your arms across your chest and gaze out the window, marveling at the vastness of deep space. A sigh overwhelms you and the co-captain asks in a timid voice, "Do you think we'll ever find another home?" You shrug your shoulders and continue to stare into icy space. It has been so long since you enjoyed life on earth, too long. The alien attack upon your home planet was a brutal one, it claimed the lives of all but yourself, the co-captain, and 4.5 million other lives in suspended animation aboard the galactic cruiser, the *Arkanoid.* Dotted across the universe are the stars, too numerous to count. You hope one of these stars will prove to be a sun of a solar system not too unlike that of the Milky Way.

Suddenly a bolt of green light flashes above and the entire cruiser rocks, forcing you to the floor. The entire cabin becomes black except for the pulsating red alarm lights and the neon glow of computer terminals. You steal a glance out the window and catch a glimpse of an alien drone ship darting away. Over at one terminal, the co-captain examines the screen and quickly turns to you, her eyes full of fear. The entire upper deck of the *Arkanoid* is destroyed and the fission reactor has overloaded, flooding the cruiser with radiation. You grab the co-captain's arm and lead her through the halls past the precious cargo of human lives and board the escape capsule. As the capsule begins its trek for help, it is mysteriously transported somewhere by someone.

Arkanoid is a fast action arcade game that is especially designed to push you and your Amiga's capabilities to the limit. If you've enjoyed *Breakout* on past systems, you'll definitely love *Arkanoid.* This game reminds people of the popular *Breakout* games from the past, for the concept is the same—to bounce a little ball constantly against rows of bricks until they are all destroyed. However, *Arkanoid* has taken this concept and elaborated greatly on it.

The game has thirty-two levels of play plus an additional "final episode" screen. The graphics are beautiful and the animation is fluid, considering all that happens on the screen at one time. There are multi-color bricks, each worth a different point value and arranged on the screen differently. Classic *Breakout* games were often made of rows of such bricks, but *Arkanoid* has a different brick pattern for each screen—from rows, to umbrellas, to an alien from "Space Invaders." However, what makes this game more entertaining is not the mere presence of multi-levels, but the many options available on each screen. First of all, there are the many different colored bricks, but there are special silver and gold bricks as well. The silver bricks require multiple hits before they break, and of course the harder screens require more hits per silver brick than the easier screens! The gold bricks are indestructible; you can bounce the ball as many times as you like against these bricks and they'll never break.

To top things off, some bricks will drop capsules when you break them. There are seven different types of capsules that will drop down towards your Vaus (the paddle). If you manage to catch the capsules, your Vaus will acquire special characteristics helpful in playing the game. One capsule is labeled "S" for "slow;" if you catch this one, the ball will slow down temporarily, which is extremely helpful in higher levels when the ball increases speed as you play until you can barely watch it bounce off the walls any more. Another helpful capsule is the "expand" capsule which will stretch your Vaus to twice its original length. There are also capsules which will allow you to "catch" the energy ball and release it instead of merely bouncing it, "break" out of the screen you are currently playing on and into the next, and receive an extra paddle.

However, two of my personal favorites are the "disruption" and "laser" capsules. When the "disruption" capsule is caught, the energy ball that you bounce around splits into three balls! It is hectic juggling three balls on the screen, but it does come in handy on some screens where there are bricks in hard-to-reach places. But everyone's favorite has to be the "laser" capsule. Once this capsule is caught, your Vaus transforms into a laser tank and by clicking the mouse button, you can fire lasers to break the bricks. This is especially nice when there are screens with large numbers of silver bricks, however those gold bricks are impervious to everything, lasers included!

If all this weren't enough for you to watch out for, there is the constant invasion of "konerds," "pyradoks," "tri-spheres," and "opopos." These meanies are obstacles which can easily be destroyed and pose no threat other than getting in the way. However, they can seriously deflect your energy ball away from the

Continued on page 48



VAMPIRE'S EMPIRE
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Deep in the Transylvanian forest, in the depths of his underground lair, Count Dracula and his minions stir. For now, with a new vengeance the vampires awaken! The modern world does not believe the horror of their existence. They are like sheep beeing led to the slaughter and someone must help them. Armed with your Magic Light, mirrors and garlic you fight your way through the Vampire's Empire to battle the evil Count. For YOU are Dr. Van Helsing, the scourge of all vampires!
High resolution smooth scrolling graphics • Over 240 perilous screen •Frightening atmosphere with lots of surprises • A unique blend of adventure, actions and stategy • not recommended for persons with weak souls •
Amiga screens shown
Amiga is a trademark of Commodore Electronics, Ltd. For more information, contact DigiTek, Inc. 10415 N. Fla Ave, Suite 410, Tampa, FL 33612. Authors wanted. Call us.
MAGIC BYTES
DigiTek, Inc.

by Gary V. Fields

The 64 Emulator

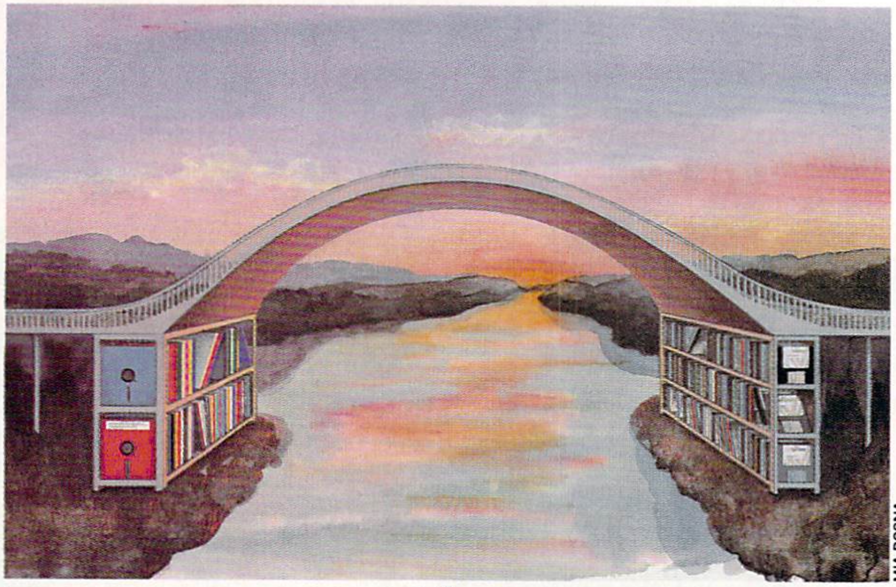
Computer: Amiga
Publisher: ReadySoft, Inc.
P.O. Box 1222
Lewiston, NY 14092
Price: $39.95
($59.95 with serial interface)

The 64 Emulator is a software bridge which attempts to span the barrier preventing Amiga users from using Commodore 64 software. The advantage of such a link is obvious. Until now, a 64 owner wanting to move up to the Amiga had to either abandon his 64 software library or maintain two separate systems. No 64 owner wants to turn his back on the faithful 64 and the thousands of great programs for it. But without a 64 mode emulator for the Amiga and an interface to transfer 5.25-inch format files to the Amiga's 3.5-inch format, that is exactly what each owner of both systems has had to do. *The 64 Emulator* promises the owner of both computers a way to enjoy the best of both the eight bit and 16/32 bit world.

The program, stored on a 3.5-inch disk, is auto booting. Once loaded, you will see ReadySoft's title screen followed quickly by the famous light blue on dark blue Commodore 64 screen display complete with the READY cursor flashing and the notice that you have 38911 BASIC bytes free. The only obvious difference between this display and the real thing is the lack of borders on the right and left of the screen.

The *Emulator*'s optional serial interface cable allows you to connect a 1541 (or compatible) disk drive to the parallel port on the Amiga. To access that drive you simply direct DOS commands to device #8, as with the 64. But because the program also recognizes the Amiga's internal drive (DF0:) as device #10, you can use that drive just as easily. If you connect the optional interface cable, you can move files and programs stored on a 1541 disk to a native Amiga disk. The program will work with files packed on the 3.5-inch drives as either 1541 compatible or Amiga compatible. The advantage of saving files in the Amiga format is obvious since the tiny 3.5-inch disk can hold 880K of data verses only 170K for the 1541.

At first glance, the program appears to perform exactly like a Commodore 64. If you issue a BASIC command, it is executed. If you type in a BASIC program, you can save it to disk just as if you were working on a real 64. Loading files is just as simple. When you want to execute the program you simply type RUN. True to the 64's architecture, you can load memory-specific programs (ML) by adding ",1" to the load command.


MIA BOSNA

The 64 Emulator was developed with the 64 productivity user in mind—not the arcade player.

Because the Amiga's keyboard is different than the 64's, some keys had to be reassigned. The ESC key replaces the 64's RUN/STOP key, and F10 is the equivalent of CLR/HOME. Function keys 1-8 work just like their 64 counterparts. I was pleased to find the Amiga's numeric keyboard was alive as well (a feature 128 owners working in 64 mode will envy).

Now we get to the nitty gritty—how well does the program emulate the 64's operating system? Unfortunately, the answer to that question must be qualified. Any program that must translate code will operate slower than one running in native code. That's why BASIC code always runs much slower than machine language code—it has to be translated before it can be performed. The same is true with *The 64 Emulator*, plus the translation has to go one step further, not only from one language to another, but from machine (64) to machine (Amiga).

As a result, all the programs I ran on *The 64 Emulator* took from two to ten times longer. For example, a simple BASIC counting loop which took two seconds on the native 64, required ten seconds to execute using the *Emulator*. The most noticeable delays occurred when the *Emulator* tried to duplicate the SID (sound interface device) chip from BASIC.

On the brighter side, the sound effects generated with ML code showed only a slight delay (although they were far inferior to the 64's native SID). The same was true of program execution—commercial software (using ML code) always executed much faster than those written in BASIC. But again this must be qualified. An example is GEOS which will run with *The 64 Emulator* (providing the serial interface cable and a 1541-compatible disk drive are used). While the pointer action of GEOS didn't seem to lose much speed, flipping pages on the desktop was embarrassingly slow. It took the program an agonizing 11 seconds to flip one page. But once a tool was selected speed improved. While using *geoPaint* in the free-hand drawing mode, I found sketching on the screen quick and pleasurable, but when more powerful options (like box or oval) were selected, the action slowed again.

The main disk comes with a transfer program which allows you to transfer files stored on 5.25-inch disks to the Amiga's native 3.5-inch format. Commodore 64 users will be delighted to see a directory on their 3.5-inch disk report 3366 blocks free instead of the 664 blocks the 64's native 1541 drive allots. There is also a configuration option which lets you reassign modes of operation and devices. With this option you can rename the internal drive

(DF0:) as device #8, remove borders or even switch the display from color to monochrome. Monochrome display will increase the speed of most programs slightly.

Whether *The 64 Emulator* will be useful to you is not easily answered. It will not load and execute all the software for the 64, and many of the games that it will load perform so sluggishly that they are all but useless. I could never test *all* 64 software, but of the commercial programs I tried about half worked. After trying a short list I can report: *PacMan* works at an acceptable speed, *WordPro 64 Plus* works like a gem, *PitStop* loads but crashes, GEOS loads but is slow, and *Uridium* goes into a never-ending loop.

Co-developer David Foster says they are working on increasing the program's speed. He said they developed the program with the 64 productivity user in mind—not the arcade player. They see *The 64 Emulator* as a valuable utility for transferring text and data files between the two systems. Having volumes upon volumes of text files in the 64 and 128 format, the ability to transfer them to the Amiga is excuse enough for me to purchase *The 64 Emulator*. Those who are hoping to move more demanding files may not be as pleased with the *Emulator's* performance.

One feature I liked was the program's friendly reset sequence. If you are using a commercial program which does not allow you to exit to BASIC, you can usually escape without having to reload *The 64 Emulator*, by pressing the CTRL, Left ALT, and HELP keys simultaneously.

As you would expect, the programmers of the *Emulator* had to make some compromises which everyone may not appreciate. If a 5.25-inch disk drive is used, any device normally connected to the parallel port (used by most of us for a printer) must be disconnected. A logical solution to this dilemma is to transfer all important files or programs to a 3.5-inch disk using the Transfer program (which comes with *The 64 Emulator*) first.

Some programs which will load still won't work properly, because the *Emulator* has trouble displaying multi-colored sprites. For instance, I was able to load and run Broderbund's *Raid on Bungling Bay* without a hitch, but when the game began, the carrier was displayed properly, but the attack helicopter sprites were invisible.

Every owner of more than one computer longs for some link which would allow the two to share software and peripherals. But as the old saw goes, "You can't have your cake and eat it too." There are exceptions to this—the 128 is a good example. It provides a sound bridge between the 64, the 128 and CP/M. Unfortunately, those hoping to find an equally sound bridge between their 64 and Amiga will be disappointed with *The 64 Emulator*. The bridge built between the two systems by the current version of the *Emulator* is shaky. As is true with most emulators, *The 64 Emulator* is slow (compared to the native 64's speed) and not 100% compatible with all 64 software.

Nonetheless, the program will be a welcome addition to many software libraries. If the programs you need are compatible, use few sound effects and are either tight BASIC code or all machine language, the program may be just what you need. The real problem now is not knowing which of your programs will work at an acceptable speed. Each *Emulator* user will have to approach each software package with a question mark. We hope future revisions of the program will offer improvements which will erase those marks. ■

Reviewed by Jeffery Scott Hall

Moebius

Computer: Amiga
Publisher: Origin Systems Inc.
Distributor: Broderbund Software
17 Paul Drive
San Rafael, CA 94903
Price: $59.95

Tired of playing the same old "hack-em, slash-em, spell-casting, bash-em" adventure games? Then strap on your bandana and prepare to be totally absorbed in *Moebius*, a brand new game from Origin Systems.

Your objective in *Moebius* is to explore the ruins of Khantun and recover the "Orb of Celestial Harmony." The Orb was constructed by Moebius himself from molten lava in the fire realm. He forged a crystal to contain each of the four elements (earth, water, fire and air). The elements were kept in balance with one another, hence the name "Orb of Celestial Harmony."

Without the Orb, Moebius (the Windwalker) must stay in his plane and cannot pursue Kaimen who stole it. While this Orb lies in one of the four ruins (earth, water, fire and air), Khantun is plagued by droughts, rain and even earthquakes. Those who opposed Kaimen are now dead, and those who remain live in fear.

You, as young disciple, must make a stand and try to recover the Orb before it is too late. If you succeed you will have freed Khantun from certain doom and will be given eternal life!

Training

Before you can embark on your journey, you must pass three levels of training: Hand-to-Hand Combat, Sword Fighting, and Divination. In Hand-to-Hand Combat, you will be able to perform an array of karate moves. Sword Fighting requires you to perform various Samurai-type moves using your sword. In the third level of training, Divination, you must prove your mental skills by containing the spirit inside the cage. If you do not succeed in any one of the training levels, you may start over until you complete it.

The Journey

After completing all three levels of training, it is time to set out on your journey. The screen is split horizontally—the



top is the playfield, and the bottom displays the menu options and your disciple's status.

The lower-right corner of the screen displays how much food and water you have left. You begin with a full supply, which you will use up along the way. If your supply is empty, you will eventually die, so look for more food and water throughout your journey. On the lower-left corner of the screen you will find your disciple's current status. This will show his current level, experience points and also his mind and body points. If body points reach zero, your character is dead.

Icons representing different actions are available on screen. Ten icons will always be there, and four more are available if you have any special weapons (i.e., hammer, shurikens, sword, fireball). The options allow your disciple to view maps, listen for movement, communicate with peasants, toggle between sword/hand-to-hand combat, and use magic or one of your special weapons.

Your journey begins on one of the four realms. As you travel you will find many useful objects ranging from maps to tiger teeth. These will automatically be put in your pouch for later use. In addition to searching for the Orb, you must also try to liberate the good monks who are imprisoned by Kaimen. Once you have returned a good monk, he will bless your sword to give it a certain power, give you a curious artifact, and teach you a prayer. Each time you do this, Moebius will call death to himself, giving you an extra life. In order for you to rescue the good monks and advance to the next realm, you must conquer the evil monk in each of the two Shrines which has been taken over.

During your journey, Moebius will make mental contact with you to tell how you are doing and how well you have progressed. If he finds that you have gained many experience points, he will give you an order or new name for your disciple, which will make him stronger and help in your quest.

Combat

During your journey, you will meet up with some evil foes. Don't turn tail and run when you encounter a foe, for you are a lean, mean, fighting human being. The combat screen offers five attack methods: Hand-to-Hand, Sword Fighting, Shurikens (throwing stars laced with poison), Utter Prayer, and Divination.

Hand-to-Hand lets you fight your opponent with karate-type moves. This is faster than Sword Fighting and proves to be a challenge for any foe. Sword Fighting is similar to the method Samurai warriors used long ago. Your training in this field is very good, and while this is not as fast as karate, it is much more powerful.

Shurikens are only useful *before* you encounter a foe to help you avoid combat. If your opponent is more powerful than you, throw a shuriken in his direction and he'll drop like a fly!

Divination lets you discover the true nature of the artifacts you received each time you saved a good monk. Once you have contained the spirit, you may perform a number of magical tricks with the different artifacts. The artifacts are Ventriloquism (makes foes think you are elsewhere), Paralysis (makes everyone nearby freeze), Teleport (takes you and everyone in contact with you elsewhere), Spirit (allows you to pass through solid objects), and Were Spell (will transform you to a native beast).

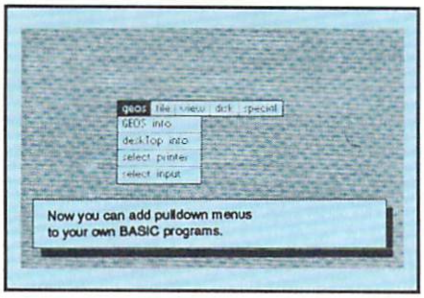
Last but not least is the final combat option Utter Prayer, which was taught to you by a good monk. With these prayers you can speak with the dead, remove all enemies from your presence, walk on water, cure sickness, and see in the dark. Before you may utter a prayer you must fast, causing your body points to drop.

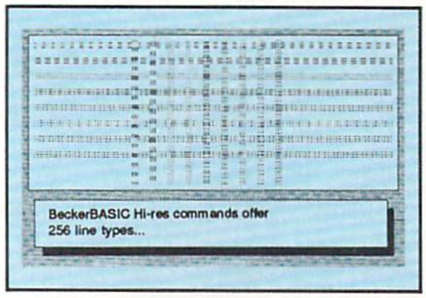
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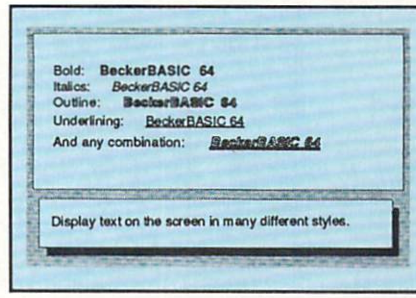
Moebius is a superior quality adventure game with captivating graphics, sound, and music. The manual is very comprehensive, explaining mouse and keyboard controls and other things you will need to know before you start your journey. The game would not be complete without the oriental bandanna and poster Origin Systems included to help put you in the mood for playing the game. *Moebius* combines karate, sword fighting, adventure, and a touch of magic to come up with a very innovative game.

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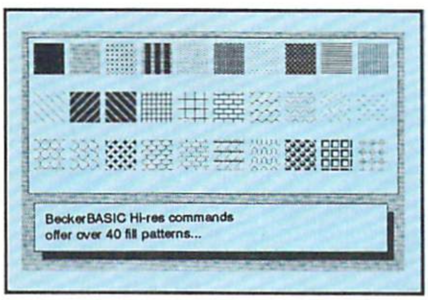
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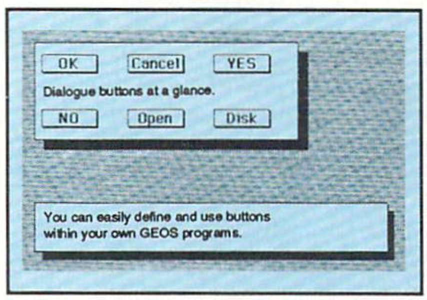
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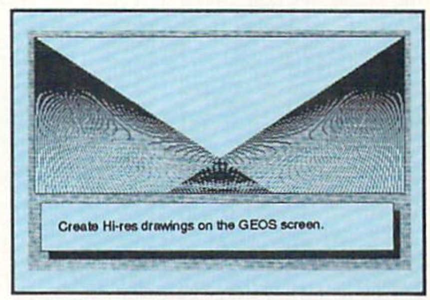
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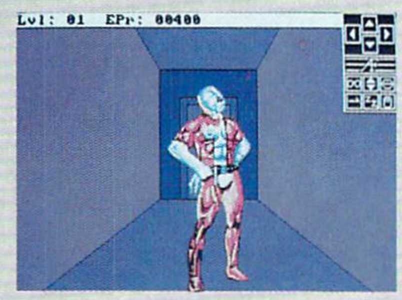
Reviewed by Russ Ceccola

Alien Fires, 2199 A.D.

Computer: Amiga
Publisher: Jagware Inc.
2-288 Montreal Rd.
Ottawa, Canada K1L 6B9
Price: $39.95



Along with the use of speech and graphics, *2199 A.D.* makes incredible sounds come from your Amiga's speaker.



Most role-playing games take place in the fantasy realm. From hideous monsters and deep dark dungeons to magnificent castles and beautiful princesses, it's all been covered. Also, not too many role-playing games have been either translated to or written for the Amiga. *Alien Fires, 2199 A.D.* is a revolutionary role-playing game that takes full advantage of the power of the Amiga and explores a less-traveled genre—science fiction. The degree of complexity is high, but so is the addictiveness of this 3D graphic adventure.

Alien Fires, 2199 A.D. is introduced in the game manual as the first in a series of games from Jagware to take place in the future. Jagware claims dedication to combining all the essential elements of computer gaming in the series, from using the full potential of the computer to making the game as fun as possible. If *Alien Fires, 2199 A.D.* is representative of future installments in the series, then Jagware better release the next game quickly to keep the fans of the first in the series (myself included) happy.

Your goal in *2199 A.D.* is simple to explain, but difficult to achieve. You are a temporary TimeLord, one of a race of beings responsible for protecting the temporal balance of the universe from chaos and destruction. Your status as a TimeLord is contingent upon the completion of your assignment from the TimeLord Elders, the leaders of all TimeLords. Their assemblage, known as the Elder's Council, is constantly reviewing your performance to see if you should be allowed to continue your mission and remain a TimeLord.

Your mission in *2199 A.D.* revolves around a brilliant scientist named Samuel Kurtz. Kurtz has created a device that threatens to twist the fabric of time. You must find Kurtz on a planet at the end of the known universe called Galaxy's End and destroy the time-transportation device in his possession, proving yourself to the TimeLord Elders as a worthy candidate for the TimeLord profession. *2199 A.D.*'s goal is difficult. Not only is it hard to even find Kurtz and the objects you need to render his device useless, but you must also contend with other hostile alien creatures and solve some puzzles before you have a stab at Kurtz.

Alien Fires will keep you occupied for many hours with the involved plot through which you must propel your TimeLord character. To start the whole thing off, you must create the TimeLord who will be your representative in the world of *2199 A.D.* You will use this character throughout the *Alien Fires* series, so by the end of *2199 A.D.* your TimeLord will be talented enough for a new adventure. Creating your TimeLord is a simple process that consists of assigning a pool of 99 points to seven different skills that already have a minimum of 20 points. The skills are: fighting, marksmanship, diplomacy, dexterity, understanding, tracking and quickness. Their effect on your progress in the game is very important—different from other role-playing games in that combinations of skills govern some situations in *2199 A.D.* as opposed to just a single attribute controlling an encounter or puzzle.

In addition to the skill selection, you give the TimeLord a name. Almost immediately, you're off and exploring. The only stats that your TimeLord has in *2199 A.D.* are the skill values, name, level, EPs (Experience Points), Combat Readiness and Item List. Combat Readiness is something different for role-playing games. An outline of your character appears on the screen with colors shaded to indicate where armor is protecting the body. If there is no shading in a part of the body outline, then that part is vulnerable to enemy attack during combat. Underneath the outline is a number indicating the amount of damage your TimeLord can take in battle (Hit Points or HPs) and a rotating color band that shows performance by the speed of rotation. The faster the band rotates, the better your TimeLord is performing.

The Combat Readiness outline/picture, along with the other stats, pops up when you select the *Alien Fires* logo in an icon command window in the upper-right corner of the screen with the mouse's left button. *2199 A.D.* can be played exclusively with either the keyboard or the mouse, but I would strongly recommend that you play the game entirely with the mouse. *2199 A.D.* is one of the few games that I've played on the Amiga that makes the mouse really feel like an extension of your body. Play progresses smoothly and effortlessly because of the mouse as well as the use of icons for TimeLord control.

There are eleven icons in the small window in the upper-right corner. Four of the icons are arrows for the directions of the compass. One contains an up and down arrow for climbing. Another is the *Alien Fires* logo that accesses the TimeLord stats screen. The last five are used for examining an object or character, saying something to a character, giving an object to another character, using your hands for manipulating items and sleeping (saving the game). Also, clicking the right mouse button brings up your inventory up on the screen in a window. At any one time, only three items may be ready for immediate use. Playing *2199 A.D.* consists simply of clicking on an icon or using the arrow

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Reviewed by Russ Ceccola

Leisure Suit Larry in the Land of the Lounge Lizards

Computer: Amiga
Publisher: Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
Price: $39.95



Larry is 40 years old and single and is desperately searching for beautiful girls.



Where can adult humor, pretty girls, safe sex, gambling, drinking, dancing, seducing, quick weddings and cheap wine all be experienced in one night? Only in Lost Wages, of course. And where, exactly, is Lost Wages? It's contained on every disk that comes with *Leisure Suit Larry in the Land of the Lounge Lizards*. A new 3D animated adventure from Sierra On-Line, *Leisure Suit Larry* may just have the longest name of any game (*Nord and Bert*. . . is a close runner-up), and it's the most serious attempt to date at a game targeted for adults.

Leisure Suit Larry puts you in the role of Larry Laffer, a loser of a guy with a very important goal. Larry is 40 years old and single and is desperately searching for beautiful girls. He decides that the best place to go to try to break out of his rut is Lost Wages. You take over from there. You must guide Larry through colorful situations in Lost Wages and ultimately help him overcome his nerdy ways and meet and seduce the girl of his dreams.

Leisure Suit Larry isn't a very tough game. However, there is a lot to do in order to succeed and all of it is fun, yet challenging. Only after playing *Leisure Suit Larry* and overcoming your obstacles will you realize that the game allows you to romp good-naturedly through Lost Wages without too many headaches. Achieving the goal involves a lot more than you may imagine. After playing *Leisure Suit Larry,* you will come to know Lost Wages much better.

A warning is printed on the outside of the game box that indicates that adult subject matter is contained in the game. Also, at the start of the game, five questions are asked that reasonably, yet humorously, test the maturity level of the player. With these two attempts, those for whom the game is really not targeted should be screened.

However, the "adult situations" contained in *Leisure Suit Larry* are harmlessly dealt with in high humor. Potentially graphic seduction scenes are covered by CENSORED signs, and there is no off-color language in the game. This innocent brand of adult humor is what makes *Leisure Suit Larry* so distinctively funny and eminently popular. Anyway, from my experiences with today's children, most of the material contained in *Leisure Suit Larry* is common knowledge by the end of grade school. So, don't feel that you have to hide the game from your children. *Leisure Suit Larry* is just like a typical TV sitcom downloaded to a disk.

The two most endearing elements of *Leisure Suit Larry* are the cute graphics and the sarcastically funny situations and jokes contained throughout the game. Graphics artist Mark Crowe and programmer Al Lowe, Sierra On-Line's resident wackos, did their jobs quite well in presenting *Leisure Suit Larry* to an adult-populated computer market. The graphics are clean and use the Amiga's power to create the effect of cartoonish images, movements and characters.

Leisure Suit Larry is really a text and graphics game in that you move Larry around on the screen, the bulk of which is a picture of your present location, yet you must talk to people and manipulate objects by using the text lines at the bottom of the screen. Function keys perform various duties, such as saving and restoring games, turning the sound off or on and changing the speed of Larry's movements. Joystick, mouse and keyboard can all move Larry, and five menus await pulling down at the top of the screen (via mouse).

A smile will never leave your face (unless you die or forget a prophylactic) while playing *Leisure Suit Larry.* The humor even invades the menus. One of the four funny menu entries is a calculator which, when activated, indicates that the extent of your mathematical abilities is $2+2=4$. Check out the people in the Lost Wages Casino, too. Little old ladies jump up and down as they hit the jackpot on the slot machines.

Essential to your success in *Leisure Suit Larry* is your knowledge of all that Lost Wages has to offer to a lonely bachelor looking for a good time. The town of Lost Wages is small, yet there is a lot to do in the place that never sleeps. Accessible by taxi cab are the Lost Wages Casino, Lost Wages Disco, Lefty's Bar, Quiki Wed Chapel and Quiki Mart convenience store. Knowing what to find in each of these places will bring you that much closer to

Continued on page 90

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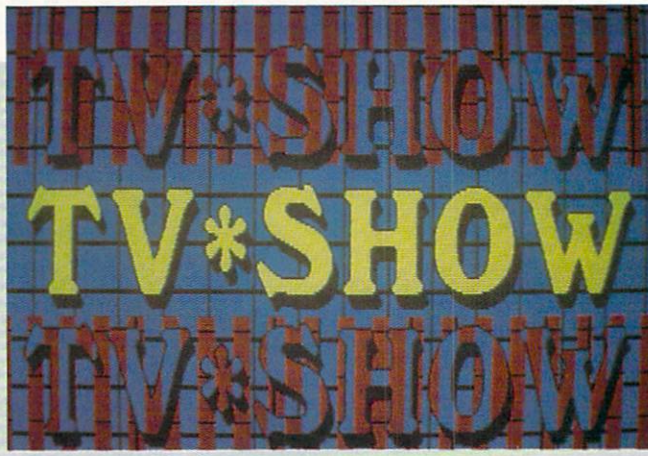


Only Amiga Makes It Possible.

Reviewed by Steve King

TV*SHOW

Computer: Amiga
Publisher: Zuma Group, Inc.
Distributor: Brown-Wagh Publishing, Inc.
16795 Lark Ave., Suite 210
Los Gatos, CA 95030
Price: $99.95



*TV*SHOW* shines in two areas—user interface and special transition effects.

Video is, perhaps, the most powerful communication medium available today. With the advent of computers, people who were neither artists nor graphic designers can produce stunning graphic video presentations. The Amiga family of computers brought this ability within reach of those who couldn't afford to spend ten thousand dollars for a quality graphic computer.

There are basically two parts to a video presentation: creating the artwork and then displaying it in an effective manner. *TV*SHOW,* developed by the Zuma Group, is a comprehensive, easy-to-use program which displays artwork created by other programs. These can be digitized pictures, graphs from spreadsheet programs, or art from paint programs. This is made possible by the use of the IFF format adopted by almost all Amiga developers. Simply speaking, this is a standard method of saving a computer-generated picture or image to a disk which easily enables programs to load and use graphics generated by other programs. *TV*SHOW* will accept graphics generated in all Amiga video modes including HAM and Extra-Half-Brite, but it will not display objects on screen in these two resolutions.

*TV*SHOW* is actually comprised of two separate programs—the Editor and the Player. The Editor puts your presentation together, and the Player takes the script generated by the Editor and displays the show. While several public domain and shareware programs accomplish the same purpose, those programs are cumbersome and limited in scope. *TV*SHOW* shines in two areas—user interface and special transition effects.

As I mentioned before, the Editor writes a script which contains what the Zuma Group calls "events." An event can be the displaying of a picture (or screen), the movement of an object across the screen, a voice narration, color cycling, or loop or key commands. A simple example of a screen event is the loading of an image from a disk, fading it in, displaying it for eight seconds, and fading it out. A series of events makes up your show which is all documented in the script file.

Writing the script has been made extraordinarily easy and quite enjoyable. Once you have typed in the name of the image to use, the rest is accomplished by simply pointing and clicking the mouse pointer at various icons and gadgets. You can chose numerous ways for each Screen event to appear. For example, it can fade in, roll up or down with the option of pushing the existing picture off the screen (rather than covering it up), or appear in one of over 25 other ways. You can even control the speed at which it appears. Most of these transitional options, however, are not described in the manual nor are they obvious from the icons on the screen. Experimentation is the key word here! You then specify how long you want the screen to remain displayed before the next event occurs. You can even direct the program to wait for a keystroke or mouse click before proceeding.

An Object event deals with images which generally are smaller than full-screen pictures such as *DeluxePaint II* brushes. An object can not only be displayed, but can also be moved across the screen to a specified location in a number of user-defined ways and directions. It can then either remain on the screen (until the next screen appears or until you direct it to disappear) or it can be moved off the screen. You can use this type of event to create simple animation effects. For example, you can load a screen containing a sales chart then load an object such as the words "SALES UP in 1988!" created by a graphics program. Now you can make the words slide down over the graph and come to rest in the middle. After several seconds, the words can be faded out. Another nice feature for both objects and screens is the ability to turn on color cycling (but only if it was utilized in the program used to create the artwork).

At any time during the editing process, you can see your show. The Editor provides the option to view a single event, a range of events or all events. Once viewed, the program automatically returns you to the Editor. You can also easily rearrange the order of your show, delete events or add events to an already completed script. The Loop feature allows you to repeat the show or specified parts of it continuously. In the present version, only one loop sequence is permitted.

The Speech event is another interesting feature of *TV*SHOW.* Using the Amiga's built-in synthesized speech capability, you can specify a text file on a disk (created by an ordinary editor or word processor) and at a specified point in the show, the computer will speak the words in that file.

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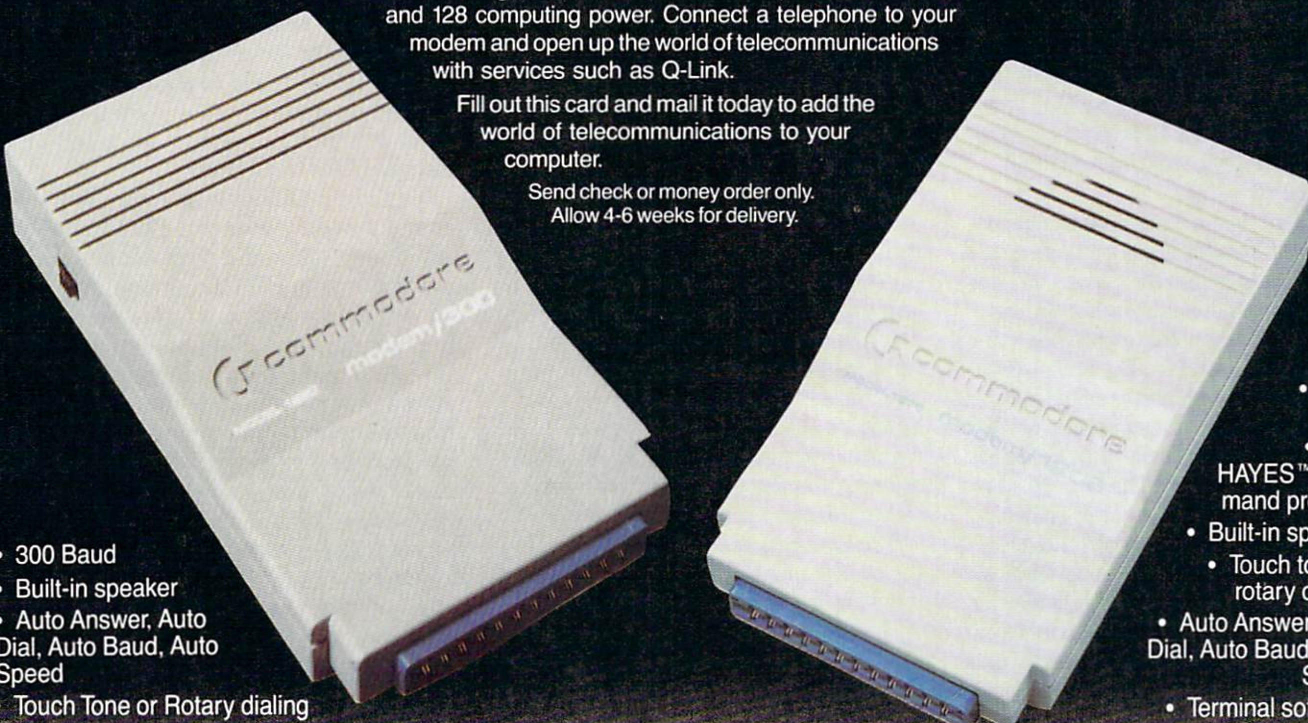
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Byte Box

Reviewed by Tim Jones

Computer: Amiga 500
Manufacturer: Byte by Byte
Arboretum Plaza II
9442 Capitol of Texas Hwy. N
Suite 150
Austin, TX 78759
Price: Prices Vary - 0K $299.95

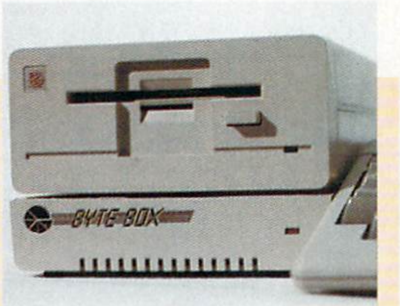
Byte by Byte is one of the companies that has been involved in Amiga development since its introduction in 1985. Through various hardware and software ventures, notably the PAL expansion unit and *Sculpt 3-D*, Byte by Byte has established themselves as an innovator in both fields. At COMDEX last fall, they introduced a new device for the Amiga 500 called the Byte Box.

The Byte Box is a memory expansion unit that allows for expansion from 512K to 2MB. It plugs into the Amiga 500's expansion port and, among other things, gives you a great place to put your external 3.5-inch disk drive. The unit is designed with the smallest possible footprint but still maintains enough room inside for the installation of the 64 chips required for expansion to 2MB. The Byte Box is self-powered and uses a power-on detection circuit to recognize when the Amiga is on or off, switching itself appropriately.

The Byte Box used for this review had 512K of RAM. This is a great way to purchase the unit, since the suggested list on the unit with 512K is $399.95. As you need more expansion you can simply purchase additional chips to increase the capacity to either 1 or 2MB. If you prefer, you can purchase the Byte Box totally bare or with the full 2MB installed.

If you've purchased a bare unit or one with less than 2MB of RAM installed, installing additional RAM is a simple task, provided a little care is taken. As with most computer components, RAM chips are sensitive to static charges, so it is best to handle them in a relatively static-free environment. Also, you must be careful not to bend any pins when inserting the chips into the sockets.

No matter what Byte Box configuration you purchase, the additional RAM will make you wonder how you got along without it before. Programs that used to be limited by a 512K machine now run exceptionally well. Two good examples are *Deluxe Music Construction Set*, from Electronic Arts, and Byte by Byte's own *Sculpt 3-D*. By increasing the amount of memory available for data manipulation, not only can you work with larger scores or images, but the processing overhead is also substantially reduced.



The additional RAM will make you wonder how you got along without Byte Box

Once you have updated the unit to the memory level that you want following the chip diagrams supplied, you can test the unit using the very comprehensive set of diagnostics Byte by Byte has included. By running the tests supplied, you will be told, via a graphic representation of the component board layout, if you have made a mistake or have a bad RAM chip. If everything checks out, you simply reset a test jumper and you're in business.

The Byte Box was designed to match the environment of the Amiga 500. The profile is low so that it doesn't interfere with your left hand, and the power-on indicator is aligned with the drive active light of the 1010 external drive.

The only disappointment about the unit was the lack of a pass-through for the expansion bus. When asked about this decision, Scott Peterson of Byte by Byte explained that a pass-through would have increased both the component count and cost—adding to the final size and price of the unit. Also, since most other peripherals being developed for the 500 offer a pass-through, there is little chance of a 500 owner having to choose between the Byte Box and another expansion device.

I have tested the Byte Box with the PHD-500 Hard Drive from Phoenix Electronics and Micron's Amiga 500 expansion chassis and found no problems with either device. All in all, the Byte Box is a very good value, and the ability to vary the amount of memory on board by simply plugging in chips makes it the most adaptable product of its type currently available. ■

Amiga Software Reviews/Arkanoid

Continued from page 36

bricks you have just aimed for or away from you!

With all of these options, it is easy to get confused. One thing you must remember is that the capsule you catch is the one that transforms your Vaus. So if you have lasers and a "slow" capsule falls, you better forget about catching it unless you're done with the lasers, because once you catch a second capsule, the first is canceled. Therefore, you better get your priorities straight! Depending on the screen, you may want "lasers" or "destruction" more than the other options. And of course that extra "paddle" capsule is always useful! Also remember that once you catch the "destruction" capsule, no other capsules will fall while you are juggling more than one ball. If you think you may want another capsule instead, purposely miss two of the three balls.

The game itself is extremely well written and incredibly addictive. Once you've played one round, you'll want to continue until you've seen all of the screens. The action is intense and the graphics are superb. Knowing that this game was in the arcade and that Discovery Software has exclusive rights with Taito (the original *Arkanoid* developers), I was anxious to see how close the Amiga version was to the arcade. To my surprise, the Amiga version was exactly like the arcade—down to the last shine on the silver bricks! The only differences are that the scores are written on the right on the Amiga instead of across the top of the screen, and the Amiga version has Discovery Software's familiar rainbow trademark scrolling in the bottom right-hand corner. Besides that, the game was an exact duplicate of the arcade. The graphics are exactly the same and even the sound must have been digitized from the arcade machine! Some people even feel that the Amiga version is better and that the mouse has better control than paddles. I had to resist reaching in my pocket for more coins when my Amiga printed "INSERT COIN" on the screen! If you are looking for a good old-fashioned arcade game that doesn't get boring no matter how many times you play it, look for *Arkanoid*. ■

The graphics are exactly the same and even the sound must have been digitized from the arcade machine!

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Reviewed by Dan Schein

Amiga Programmer's Handbook, Volumes I & II

Author: Eugene P. Mortimore
Publisher: SYBEX, Inc.
2021 Challenger Drive #100
Alameda, CA 64501
Price: $24.95 each



ART BAXTER

The Amiga Programmer's Handbook, Volumes I and II by Eugene P. Mortimore will be a welcome addition to any Amiga programmer's library. Volume I provides a detailed discussion and explanation of the Amiga's graphics-related functions and structures in the Amiga ROM kernal. Volume II presents the built-in Amiga functions (devices), along with two chapters covering general information applicable to all the functions.

Volume I

Volume I is organized in a dictionary-like format that makes finding a function easy and makes the book a real time saver. This volume is in its second edition; the first edition contains information on V1.1 of the operating system. The second edition included the 40 commands that are new under the V1.2 operating system.

This book is useful from the time you open the cover—the inside covers are actually an index to the over 300 macros and functions covered within their pages.

Each chapter in the book is dedicated to a different Amiga library, except the section on Graphics which is broken into three chapters. The chapters go into great details on the syntax, usage and results of each function available in that library. Each function also describes the purpose of the function and a discussion on the function. I don't have to tell you how nice this is if you have not used a function before (or you have to do some de-bugging work). In addition to all this useful information, each chapter begins with an introduction that discusses the library for that chapter. Also included are diagrams and other information that make understanding each library and its duties a lot easier than any other book I have seen.

If all of this were not enough, two really great appendices can be found in the back of the book. Appendix A is a glossary of the terms used in the book. This really helps by explaining all the terms you may have heard and/or read but never understood. They are explained in a very easy to understand language. Appendix B covers four video display modes not covered in Chapter 2. They include dual-playfield mode, double-playfield mode, hold-and-modify mode, and Extra-Half-Brite mode. These additional modes are covered through discussions and C language examples.

The libraries covered in Volume I are Exec, Graphics, Layers, Intuition and Icon.

An optional disk is available with four C language programs showing some of the many functions covered in this volume. For the new Amiga programmer this book and disk combo is a giant step in the right direction.

Volume II

This book was written after the V1.2 operating system was released, so it's in its first edition. The first two chapters introduce the general programming of I/O (Input/Output). These two chapters are filled with functions and techniques that will be used by all the Amiga functions.

Each function is covered individually in its own chapter. Every chapter begins with a discussion of the function including its requirements and traits. Also explained in detail are structures, the use of the function, standard and device-specific commands along with a set of diagrams to illustrate the function. An appendix gives C language examples of the Exec-Support library functions.

Functions covered are: Audio, Narrator, Parallel, Serial, Input, Console, Keyboard, Gameport, Printer, Clipboard, Timer and Trackdisk.

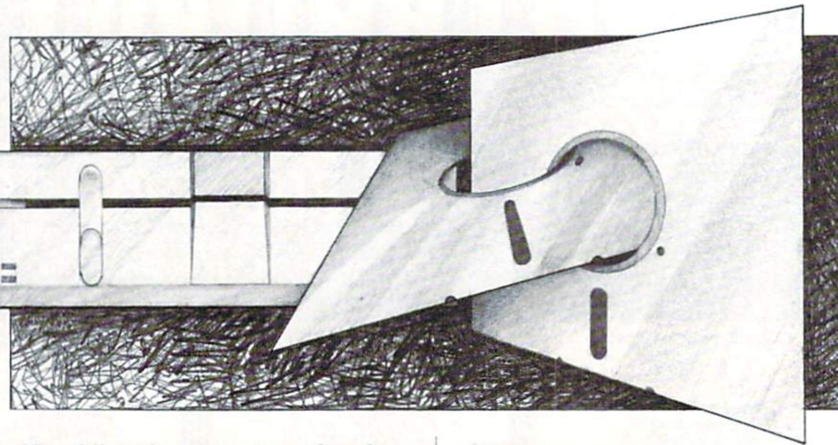
I find myself reaching for these books more and more. It seems the more I use them, the more I like them. It's like that best friend you had in school, who is always there to help, comfort, offer advice and guidance. These two books are very highly recommended for all Amiga programmers, since they will quickly become a valuable form of reference and aid. If you are serious about programming (or learning to program) the Amiga these books are a must. No good Amiga programmer will be without them.

by Parviz Naser

BASIC Linker

for the Commodore 64

Use this program to link two or more programs by simply loading them after one another.


MIA BOSNA

If you wish to use all or portions of several programs to make a new one, this short program might save you lots of typing. Just follow the instructions, which will be displayed during the course of your link session. Loading your second program following your first one will not place the second program at the beginning of BASIC RAM. Instead it will be placed after the first one, so that when you issue a LIST command, both programs will be listed as a single program. A RUN command, likewise, will execute the linked program from its first line.

The program makes use of two short machine language routines which would be placed in the cassette buffer of your computer. The one at Dec 828 would cause the BASIC pointer pointing to the beginning of BASIC RAM to point to a new address, which is just above the end-of-BASIC address of the program currently residing in memory. The machine language routine which starts at Dec 856 would cause this pointer to point to its default address. Both routines should be called in direct mode.

Type the program and SAVE it on disk or tape. Then RUN it. If the DATA statements were not typed correctly, a message will be displayed and the program ends. Otherwise, the program will NEW itself, leaving you with a free BASIC RAM, two short machine language routines in the cassette buffer, a few lines of instruction on the screen.

Now follow the instructions. Simply load your first program and issue a SYS 828 command in direct mode. This command causes the BASIC pointer (which normally points to the beginning of BASIC to point to a new address), which, as mentioned, is just above the end-of-BASIC address of your first program. If you issue a LIST command at this stage, you won't be able to get a listing of your first program. BASIC's starting address is moved up. The program is in memory, but BASIC does not think so!

Now load your second program. It will be placed in memory just after the address where the first program ended. If you list the program now, you will get only a listing of your second program. To put the start-of-BASIC pointer back at its initial state, you should issue the second SYS command (SYS 856), again in direct mode. List now and see both programs linked together.

A few notes are worth mentioning:

- If you are going to edit your linked program, you might as well renumber the individual program lines before linking, so that the first line number of your second program is somewhat higher than the last line number of your first. Otherwise, you might run into unexpected results while editing your program.
- You can link, list, and run two programs in such a way that the line numbers of the second program are lower than those of the first. As long as you have not edited it, the program will behave normally. You can show the listing to your friends and make them wonder. Run it and make them wonder even more. The reason behind this is the fact that BASIC does not pay as much attention to line numbers while listing or executing as it does during editing.
- The machine language routines are totally relocatable. Therefore, you can place them on any safe location in memory. If you don't want to use the cassette buffer, feel free. Just change the range of the FOR-TO-NEXT loop (line 12), the two SYS prompts (lines 26 and 30), and key definitions (lines 34 and 36). For example, to place the routines at Dec 50000, line 12 should be changed to FOR I = 50000 TO 50036, lines 26 and 30 should prompt SYS 50000 and SYS 50028, respectively.
- To link more than two programs, link the first two as explained. Then move up the state-of-BASIC address with the first SYS command and load the next program. Repeat the last steps as often as needed; finally, issue the second SYS command. Happy linking! ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

BASIC Linker

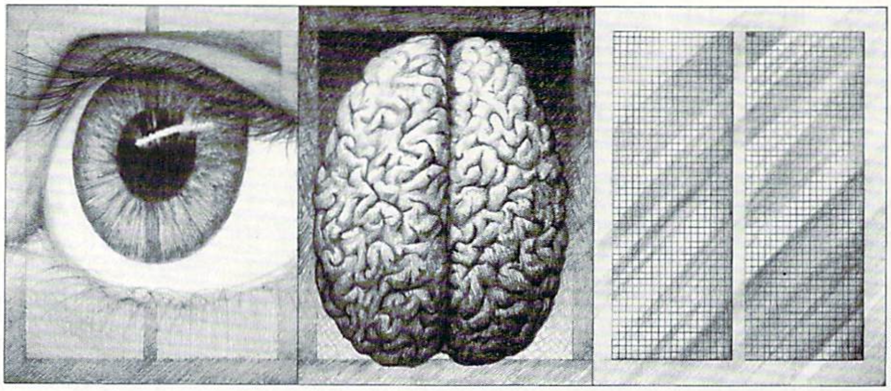
```
12 FOR I=828 TO 864'DHYC
14 READ A:POKE I,A:B=B+A'EJTF
16 NEXT:IF B=4301 THEN 20'EIMH
18 PRINT"[DOWN] ERROR IN DATA"
   :END'CBKK
20 PRINT"[CLEAR,DOWN,SPACE3]
   LINK TWO (OR MORE) PROGRAMS"'BALC
22 PRINT"[DOWN,SPACE4,RVS,SPACE3]
   DO THE FOLLOWING[SPACE3,RVOFF]
   "'BACH
24 PRINT"[DOWN]1-LOAD THE FIRST
   PROGRAM WITH SYS 828"'BAAM
28 PRINT"[DOWN]2-LOAD THE SECOND
   PROGRAM WITH SYS 856"'BAFQ
32 PRINT CHR$(27)+"T"'DEZE
38 NEW'BALH
40 DATA 165,45,133,43,165,46,133,44,
   198'BGPG
42 DATA 43,198,43,169,255,197,43,240,
   7'BFYI
44 DATA 169,254,197,43,240,1,96,198,
   44'BFBK
46 DATA 96,169,1,133,43,169'BTKK
48 DATA 8,133,44,96'BLWK
```

END

by John Iovine

Interfacing Commodore's User Port, Part 6

Building a Digital Camera, Part 3



MIA BOSNA

This month will complete the sub-series on the digital camera. As stated in the last installment, we will increase the resolution by six. The photo illustrations accompanying this installment show what the camera can do at this point in its development: imaging the covers of magazines, currency and high-contrast portraits of people.

A gray scale is of course possible, and would increase the resolution further. I may come back to work on this aspect of the project in the future, if there is sufficient interest. Again this change will involve only programming, the hardware will remain the same.

I have already said that you could explore machine vision systems and character recognition programs. From the photos accompanying this article that should be obvious. Let's push a little further now, stretch our minds and explore the possibility of interfacing to the brain. We could consider that the ultimate interfacing challenge. Our reason to accept such a challenge? To provide an artificial vision system for the visually handicapped.

Artificial Vision

The question of providing sight for the blind is not a question of possibility. Over the past few decades experiments providing electrical stimulation of the vision center of the human brain have caused totally blind people to see glowing phosphenes. The work that remains to be done to complete a vision prosthesis is a refinement in technique and technology.

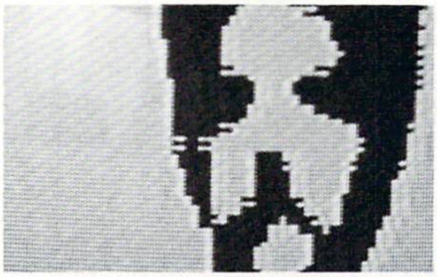
To understand where we are at the present time, let's first define a phosphene, the unit of light that has been generated. A phosphene to sighted individuals can be described as the after image left from a flash bulb. Perhaps you can remember the after image left from the camera flash when a friend took your picture. That phosphene would resemble a glob of light that took a little while to disappear. The phosphenes generated by electrical stimulation are much smaller, more pixel like. It is interesting to note that this electrical stimulation is immediately recognized as visual information from blind research patients.

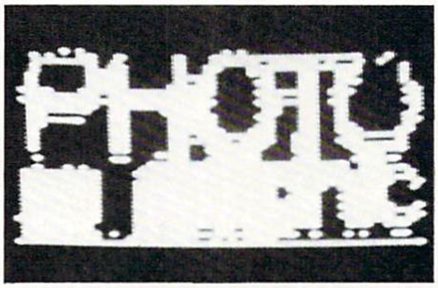
A Little History

In 1955 J.D. Shaw was issued a patent (no. 2,721,316) for a detailed system to provide electrical stimulation to the vision centers to inform the blind person of ambient light levels.

In 1968 G. Brindley and W. Lewin developed the first neural prosthesis to stimulate the occipital lobe.

In 1977 another prosthesis, the Dobelle, was developed using a matrix of 64 computer-controlled electrodes. The computer produced patterns recognizable by the blind patient. Information obtained from this experiment showed that there isn't a one-to-one correlation between electrode placement and phosphenes generated. It would appear that the next step would be a matrix decode of the vision center. (Something similar to the matrix decode I needed to perform for the D-Cam chip.)





Since these pioneering experiments, more information on visual processes has been acquired. Form, color and spatial information are processed by the brain along three distinct pathways. Different areas in the visual centers of the brain appear to predominately process one area of the aforementioned visual information. Since the information I have regarding the experiments of 1977 is sketchy, it may be that the 64 electrodes were not implanted in the most favorable area of the vision center. This leads us to believe that considerable improvement could be obtained with this single advancement.

D-Cam

The type of digital camera we built could provide the front end processing unit for continued experiments. But real hope lies in the possibility that it may also be used as the back end. If we could use the memory cells on the silicon wafer as the electrodes, our resolution would increase dramatically. The assumption is based on the following:

If you remember, our memory cells are loaded with a binary 1s which is equal to +5V. This five volts placed against the brain may provide sufficient electrical stimulation to produce phosphenes. If this is true, then at one end we could read the information off of one chip and then paint the image into the implanted chip with binary 1s. Our chip isn't the state of the art, of course. Superior chips are to be had at a much higher cost; with these chips, however, we could get an increase in resolution equal to or exceeding broadcast television. Our chip is using 8,152 pixel elements in bank one, but even this as compared to 64 pixels in the last mainstream experiment of 1977, would be a major improvement.

The currents used in the experiments,

however, did exceed the capacity of the pint-sized memory cells of the chip. But the current required may have been the result of the size of electrodes used and/or electrode placement. Since the memory cells are much smaller, it is possible that less current may be used for stimulation.

This ends our mental exercise, now type in the program. The menu is smaller and self explanatory. The timing is controlled by a nested loop. The first timing number is nested into the second.

The 128 listings are presented this month. We will run the 64 versions in our next issue. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

128 Hi-Res Camera

```
6 PRINT"[CLEAR]":PRINT"LOADING
  PROGRAM...."'CBAL
8 FOR L=4864 TO 5423:READ A:POKE L,A
  :B=B+A:NEXT'IUFP
10 IF B<>54770 THEN PRINT"ERROR IN
   DATA STATEMENTS":END'GHII
12 PRINT"[DOWN3]PROGRAM LOAD
   SUCESSFUL...RETURNING TO MAIN
   PROGRAM.."'BAUO
14 FOR I=1 TO 500:NEXT I'EHJE
16 LOAD"HI-RES BAS.CON",8'BCAH
18 DATA 000,001,004,005,002,003,006,
   007,008,009,012,013,010,011,
   014'BJAQ
20 DATA 015,016,017,020,021,018,019,
   022,023,024,025,028,029,026,
   027'BJUJ
22 DATA 030,031,032,033,036,037,034,
   035,038,039,040,041,044,045,
   042'BJWL
24 DATA 043,046,047,048,049,052,053,
   050,051,054,055,056,057,060,
   061'BJYN
26 DATA 058,059,062,063,065,064,000,
   001,069,068,004,005,067,066,
   002'BJVP
28 DATA 003,071,070,006,007,073,072,
   008,009,077,076,012,013,075,
   074'BJOR
30 DATA 010,011,079,078,014,015,081,
   080,016,017,085,084,020,021,
   083'BJIK
32 DATA 082,018,019,087,086,022,023,
   089,088,024,025,093,092,028,
   029'BJWM
34 DATA 091,090,026,027,095,094,030,
   031,097,096,032,033,101,100,
   036'BJOO
36 DATA 037,099,098,034,035,103,102,
   038,039,105,104,040,041,109,
   108'BJTQ
38 DATA 044,045,107,106,042,043,111,
   110,046,047,113,112,048,049,
   117'BJES
40 DATA 116,052,053,115,114,050,051,
   119,118,054,055,121,120,056,
   057'BJHL
42 DATA 125,124,060,061,123,122,058,
   059,127,126,062,000,255,000,
   255'BJHN
44 DATA 000,255,000,255,000,255,000,
   255,000,255,000,255,000,255,
   000'BJYP
46 DATA 255,000,255,000,255,000,255,
   000,255,000,255,000,255,000,
   255'BJLR
48 DATA 000,255,000,255,000,255,000,
   255,000,255,000,255,000,255,
   000'BJYT
50 DATA 255,000,255,000,255,000,255,
   000,255,000,255,000,255,000,
   255'BJLM
52 DATA 000,173,002,220,141,047,021,
   169,255,141,003,221,120,169,
   011'BJPO
54 DATA 141,002,220,160,000,162,000,
   169,011,141,000,220,185,000,
   019'BJUQ
56 DATA 141,001,221,169,009,141,000,
   220,169,001,141,000,220,189,
   064'BJRS
58 DATA 019,141,001,221,169,000,141,
   000,220,169,008,141,000,220,
   169'BJNU
60 DATA 009,141,000,220,232,224,128,
   208,225,162,000,200,192,064,
   208'BJWN
62 DATA 202,076,081,020,076,021,021,
   162,190,160,190,136,208,253,
   202'BJHP
64 DATA 208,248,234,160,000,162,000,
   169,011,141,000,220,189,000,
   019'BJUR
66 DATA 141,001,221,169,009,141,000,
   220,185,064,019,141,001,221,
   206'BJQT
68 DATA 000,220,173,013,221,201,016,
   208,119,076,006,021,200,192,
   128'BJRV
70 DATA 208,227,160,000,232,224,064,
   240,191,234,076,096,020,142,
   048'BJSO
72 DATA 021,134,255,140,049,021,132,
   253,006,253,234,169,248,037,
   253'BJAQ
74 DATA 141,051,021,165,255,041,007,
   013,051,021,168,169,000,133,
   252'BJBS
76 DATA 169,248,037,255,010,038,252,
   010,038,252,010,038,252,133,
   251'BJUU
78 DATA 165,255,074,074,074,024,101,
   254,105,032,101,252,133,252,
   096'BJTW
80 DATA 165,253,041,007,170,232,169,
   000,056,106,202,208,252,017,
   251'BJMP
82 DATA 145,251,096,165,253,041,007,
   170,232,169,000,056,106,202,
   208'BJUR
84 DATA 252,073,255,049,251,145,251,
```

```
    096,032,147,020,032,227,020,
    174'BJYT
86 DATA 048,021,172,049,021,076,131,
    020,032,147,020,032,209,020,
    174'BJAV
88 DATA 048,021,172,049,021,076,131,
    020,173,047,021,141,002,220,
    088'BJEX
90 DATA 165,212,201,017,240,003,076,
    038,021,096,120,169,011,141,
    002'BJXQ
92 DATA 220,076,017,020,255'BTQL
```

END

128 Hi-Res Control

```
10 PRINT"[CLEAR]"'BATX
20 PRINT:PRINT"[DOWN4]MAIN MENU"'CBYC
30 PRINT:PRINT'CBHA
35 PRINT"[SPACE2]1) LOAD HI-RES
   CAMERA"'BAWK
36 PRINT"[SPACE2]2) CHANGE TIMING OF
   CAMERA"'BARM
37 PRINT"[SPACE2]3) START CAMERA"'BAJK
38 PRINT"[SPACE2]4) QUIT"'BAIJ
39 FOR T=1 TO 175:NEXT'EGFL
40 POKE 212,88:POKE 208,0'CMRD
41 INPUT"ENTER CHOICE (1-4)";X'BCPG
42 IF X <1 OR X>4 THEN PRINT"PLEASE
   ENTER NUM. BETWEEN 1 & 4"
   :GOTO 41'HHXP
43 ON X GOTO 250,300,152,350'CQEH
100 REM 1452 & 1454'BJDW
150 REM DIGITAL CAMERA CONTROL
    HI-RES'BBEH
152 FOR L=5632 TO 5640:POKE L,1
    :NEXT'FOWH
155 POKE 53281,0:POKE 52382,1
    :POKE 52383,12'DYPL
160 FOR L=55296 TO 56319:POKE L,0:NEXT
    :GRAPHIC 3,1:SYS 5120'HADK
180 G=PEEK(2604):POKE 2604,
    (PEEK(2604)AND 240)+12'GBJM
185 GRAPHIC 3,1:SYS 5120'CIOL
190 POKE 2604,G'BGNF
200 GOTO 10'BCIV
250 LOAD"HI-RES CAM C-128",8'BCAF
300 PRINT"[CLEAR]"'BATX
301 PRINT:PRINT'CBHY
302 PRINT"TIMING PROGRAM" :PRINT'CBUE
303 D=PEEK(DEC("1452"))
    :F=PEEK(DEC("1454"))'GLBI
304 PRINT"OUTER TIMING LOOP IS
    CURRENTLY SET AT ";F :PRINT'CDWN
306 PRINT"INNER LOOP TIMING IS
    CURRENTLY SET AT ";D :PRINT'CDBP
307 INPUT"ENTER NEW INNER TIMING";D
    :PRINT'CDUL
308 INPUT"ENTER NEW OUTER TIMING";F
    :PRINT'CDLN
309 POKE DEC("1452"),D:POKE
    DEC("1454"),F'EJWM
310 GOTO 10'BCIX
350 END'BACC
```

END

by Robert W. Baker

Inside Q-Link

Explore the inner workings of the Q-Link telecommunication service with network pro Bob Baker.

In addition to the downloadable software previews and the expanding software publishers support area in the Software Showcase, Q-Link is now holding quarterly Online Trade Shows. Most of the software publishers participating in the online support areas of the Software Showcase have been supporting the trade shows in a big way.

If you've ever been fortunate enough to attend one of the big industry shows like COMDEX or CES, then you are well aware of the amount of information that is typically available at an event like this. Less fortunate souls may have caught a glimpse of this type of affair at one of the more frequent local computer shows or fairs. Many of the software publishers attend these events to show off their wares to the general public.

In any event, the Online Trade Shows will give you the chance to learn all about the latest software from industry leaders, ask questions directly to the developers themselves, and possibly even win some free software, all without leaving your home. Plus, if you see something talked about that really interests you, and you can't wait for your local dealer to get it in stock, you can order many of the new products through Q-Link during the event.

There will be plenty of advance notice before an Online Trade Show takes place. A special area is typically available in the Software Showcase before the actual day of the show. This area usually contains information about the show itself, the companies participating and the featured products. You'll also find a special message board where you can post comments and questions on anything involving the show either before, during or after it takes place.

The Trade Show Headquarters also provides detailed information on each of the featured products along with ordering information for those products available through Q-Link. The background information for each of the participating companies will also contain a brief list of their other products that might be available besides the featured products. All this preliminary information is the just the beginning, don't forget that you'll get a chance to talk directly with the companies and get more inside or detailed information if you need it.



The Trade Show usually begins early on a weekend morning, so everyone has a chance to participate. The opening ceremony is held in the People Connection Auditorium, where the participating publishers' representatives are all introduced. From there, the representatives will break up into different People Connection rooms that you can think of as their "booths."

You can wander from booth to booth to find out what's new and what's being considered, and you can ask questions about their software products. As an added attraction, many publishers will be giving away door prizes of free software to lucky subscribers who happen to be in their booth when the drawings are held.

At the end of the show, everyone is invited back to the Auditorium for the closing ceremony. Here you'll find out where you can go for more information on products discussed, plus the winner of the grand prize will be selected. In past shows, one lucky subscriber won a collection of software that included a top-selling title from each of the participating companies! After the show, the Trade Show Headquarters will remain online for some time so you can still access all the show information if needed.

Besides the Online Trade Shows, there's almost always some sort of special event or contest being sponsored in the Software Showcase area. Be sure to drop by from time to time and check things out. You'll generally find announcements that list future attractions for the coming months, so you can plan ahead to participate.

Other areas of the Q-Link system hold various contests and special events as well. There's always something going on somewhere on the system, and you'll usually find something that interests you if you take a few minutes to look around. For instance, did you know there are special events in the Rabbit Jack Casino almost every night?

With summer just around the corner, be sure to check out the Q-Link Sports Center if you have any interest in baseball. There's a fantasy baseball league online during the major league season. Participants can draft players, establish their own dream teams, and compete against the National League standings. Last year there were prizes offered for the best team standings at the All-Star break with winners actually going to the real All-Star Game.

In my own area of CIN, we've rearranged the program download library in the New Product Information section of CIN. New individual libraries were created for Amiga and PC-10/MS-DOS-related material so that information could be separated from the 64/128 files in the library. However, you'll still find generic text files mixed in with the 64/128 demo files of the New Product Info library for now.

This new subdivision of the Product Information libraries helps make things easier to find, as the number of Amiga-related files was starting to grow considerably. I should mention, however, that some of the Amiga demos I've received are just too big to provide online. In response to many requests, I can now provide copies of these larger demos by mail with full permission of Q-Link and the companies involved. For more information and a list of available demo disks, check the text message in the New Product Information library menu.

About the same time these changes were being implemented, a new SIG area was created in the Commodore Community specifically for PC-10/MS-DOS users. A download library for MS-DOS-related material was also being created in the public domain libraries as well. The only drawback to using the new MS-DOS-related libraries is that you have to download the files to your 64/128 first and then transfer

the files to your PC-compatible system.

Actually, you have similar problems when downloading MS-DOS or Amiga-related files from Q-Link. In both cases the files must first be downloaded to your 64/128 and stored on one of the various Commodore format disks. The data must then be transferred to the MS-DOS or Amiga system before it can be of use. Some of the text files in these areas may be used on your 64/128, but be sure to check the file description to see how the file was created.

There are several methods of transferring files between systems, and the one you choose depends on the amount of data and the available hardware and software resources you have on hand. The transfer can be performed via software translation, special hardware interfacing, or using a simple communications link between systems. (See "Connecting Modems Directly" in the March 1988 issue of *Commodore Magazine*.)

You should always be able to perform a transfer via a serial RS232 link between systems with corresponding modems or interfaces, and with appropriate communications software at both ends. This can be done via a direct connection between systems using a null modem cable, over the phone line using modems, or even utilizing a local BBS system to upload and then download the same file. In the case of the Amiga, you can use the Central Coast *Disk-2-Disk* utility if you have a 5.25-inch floppy disk drive. This allows you to directly read 1541 or 1571 format disks from your 64/128 system. It even includes code conversion options for transferring data created on the 64 or 128 as an added benefit.

The new *Access-64* product from Progressive Peripherals and Software actually allows you to connect your 1541, 1571 or 1581 disk drive to an Amiga and directly read the files onto the Amiga. This provides the most direct and fastest method of transferring data to the Amiga from your 64/128.

One last method of transferring data to the Amiga is by using the new FAST! File Transfer created by the Amiga Alliance users on Q-Link. This file transfer system utilizes the parallel ports on both systems to transfer data at speeds of up to about 5.3K per second. Complete details are available in the Amiga library area, including the required software and complete documentation. However, you'll need to make or buy a special cable to connect the systems to perform FAST! transfers.

For transferring data to MS-DOS systems, the only other option for now is the *Big Blue Reader* utility from S.O.G.W.A.P. This utility lets 128 users with a 1571 drive transfer files onto MS-DOS diskettes. Otherwise, you'll have to resort to the serial transfer until someone designs a FAST! type file transfer for the 64/128 to MS-DOS transfer. Actually, this shouldn't be very hard with everything already defined for the 64/128-to-Amiga interface. If you know of another way to transfer files, let me know so I can pass the information on to other users.

For the time being, Amiga and MS-DOS users will have to be content with using a 64/128 to access Q-Link. A number of people have been looking at improving this situation, but nothing appeared to be happening earlier this year. On the other hand, there is at least some level of support for these systems now, and it is growing as more users take advantage of these areas.

Guess that's about it for this month. As always, I can be reached almost daily via E-Mail if you have any comments, questions or suggestions concerning this column or New Product Information section on Q-Link. ■

by Shay Addams

A Legend Comes to the Commodore

News and opinion from a leading explorer of those fantasy realms called adventure games.



Since the dawn of computer entertainment, only one fantasy role-playing game has influenced the "look and feel" of maze and monster adventures as much as the *Ultima* series—and now *Wizardry* has finally been converted for the 64 and 128. Inspired by the non-computer game system called Dungeons and Dragons, Robert Woodhead and Andrew Greenberg started writing *Wizardry* back in the late '70s, and it was released in 1981 by Sir-Tech. Practically overnight, the first scenario—*Proving Grounds of the Mad Overlord*—spawned a cult of *Wizardry* players that grew into an international community of maze-maniacs. Eventually *Wizardry* became one of the all-time best-selling Apple programs of any type.

It's a ten-level maze in which you strive to stay the evil wizard Werdna and recover an amulet stolen from Trebnor, the Mad Overlord (spell the names backwards for a clue to their origin). Your party consists of six warriors and wizards who, in addition to the standard traits and skills, are deemed good, evil or neutral. A character's moral alignment affects game-play. Evil weapons and magic items can't be wielded by a good Fighter or Mage, for example—and good and evil characters can't travel in the same party, though neutral ones may join either.

Another subtle aspect of character development is the ability to change a character's class upon attaining enough experience points, which opens up new attributes to the character. A Fighter may eventually become a Samurai who slowly learns Mage spells, for example. When planning your party in *Wizardry*, you've got to look to the future as well as around the next bend in the maze. You might get by with a crew that's all Good or Evil, but some players like to develop a variety of characters and bring in specific ones at the appropriate time.

Character creation and development are dealt with in the Castle, which consists of several text menus. All input is conducted from the keyboard, and the program uses a type-ahead buffer. While waiting for the next screen to load you can punch in a series of orders: hit "E" for Edge of Town, "T" for Training and "C" for Create Character. In these phases and in combat, information is displayed in overlapping windows. The combat report fills a horizontal window in mid-screen, where your character names are incorporated into battle reports. Most of the disk access occurs inside the Castle, and the game runs pretty much in RAM once you enter the maze.

The maze is depicted with fairly simple first-person pictures of halls and walls that look like the vector graphics you've seen in the *Star Wars* arcade game—none of the full-color "panels" used to illustrate games such as *Bard's Tale*, which, like many role-playing games that followed, was influenced heavily by the *Wizardry* game system (check out the menus in Garth's shop, then look at the ones in Boltac's store, for example). Monsters show up in the center-screen, illustrated with detailed pictures that were redrawn specifically for the Commodore machines. In addition to learning which spells to use on which monsters, you'll also have to learn to identify them. Creatures and artifacts are often disguised, so what looks like five Men in Armor may turn out to be level 10 Fighters or just a pack of weasel Orcs.

A high degree of involvement with your characters has always been a hallmark of *Wizardry*, for character development is an important and well-designed part of the game. So is the 50-spell magic system, whose spell names are related to make them easier to learn (the reference card helps, too). Instead of having a number of spell points that's reduced each time you cast a spell, this system gives you nine of each spell; it makes it easier to keep track of the number you have left. Mapping is also integral to success, for the mazes are littered with teleports, spinners, traps and other surprises.

Characters who survive this quest can go on to others in *Knight of Diamonds*, *Legacy of Llylgamyn*, and *Heart of the Maelstrom*. These don't include a character generator, so you need a party created in *Proving Grounds* in order to play them. Then there's the sequel to *Proving Grounds*—*Return of Werdna*—in which you play the role of that evil wizard, at the head of a party of monsters and under attack by adventurers. All these are being converted for the 64 and 128, but no plans exist for Amiga versions.

Wizardry supports the 128 and 64 better than most applications software. It loads more of the program into the 128's extra RAM to minimize disk access. RAM expanders for the 64 and 128 are

also supported, and the game reportedly flies on a RAM disk. Don't feel left out if you don't have one, for Woodhead devised a special DOS that permits the program to run faster than under standard DOS. In the event it doesn't work with a third-party drive, you can just switch to regular DOS. You also get to use the 128's cursor keys and numeric keypad, and the function keys have been assigned. The most useful feature added to the Commodore version allows you to save a game while inside the maze. Though *Wizardry* is seven years old, it still outclasses some of the more recent role-playing games with sharper graphics. For any hard-core maze-mapper, this game is a must.

From Frobnia to Lytton: Spies, Cops and Robbers

Marc Blank, one of the original Zork-Masters who left Infocom a few years ago, is back with an unusual spy thriller called *Border Zone*. This three-part story takes place in the Eastern Bloc nations of Frobnia and Litzenburg. In the first tale, you're an American businessman traveling by train. An American spy asks you to help stop a diplomat from being assassinated. Then there's a change of character, for in the next story you play the part of that spy, wounded and trying to get vital information to a colleague. And in the finale you become the spy who is attempting to assassinate the diplomat.

Each story is an independent game that may be played in any order, but you'll have more fun if you play them in sequence. Puzzles are mainly object-oriented, with a few characters to talk to along the way. InvisiClues are incorporated into the program, so help is only a keystroke away. To keep you on your toes, a built-in clock ticks away the seconds as the story's events unfold in a dramatic flurry. This makes it hard to map, since something seems to interrupt every time you put pencil to paper, but the real-time action contributes enormously to creating the atmosphere of a spy story. *Border Zone*'s available for the 64/128, but not the Amiga. (Infocom's *Sherlock: The Riddle of the Crown Jewels* will also be released for the Amiga—and it will also feature sound effects.)

My favorite new Amiga adventure is Sierra On-Line's *Police Quest: In Pursuit of the Death Angel*. It's a disk drive detective game in which you must work your way up from uniformed cop to plainclothes officer. Another novelty is that you have to deal with an assortment of crimes while working on the main case. Written by former California Highway Patrolman Jim Walls, *Police Quest* is also unusually realistic. (Due to the subject matter, Sierra calls it an adult-oriented game.)

The plot revolves around your efforts to nail a major cocaine dealer in the fictitious town of Lytton, which is currently suffering from a serious crime wave. Graphics and animation are treated with the same high degree of craftsmanship as the *King's Quest* series and Sierra's other animated adventures. But the puzzles differ in style. Rather than devoting your time to finding and figuring out what to do with various objects, you will face what I call "situational problems." The goal in these is to follow the procedures a real cop would under the circumstances: Always read a suspect his rights when you arrest him, for example. Fail to follow procedure, and the game ends. There's also an involved story line, with several characters who have their own personal problems.

Instead of walking from one location to the next, you drive a squad car. After you leave the station, the usual graphic display is replaced by an aerial view of the town. You steer a tiny car through traffic (be sure to stop for red lights), chase down speeders and write tickets, and race to the scenes of assorted crimes when the radio dispatcher alerts you. Events occur in a linear fashion (as in *Border Zone*), so the game has more of the feel of a genuine story than just a collection of puzzles. It's not too hard, since the manual outlines most of the procedures you have to observe, but I liked it so much I spent a week solving it.

Clues of the Month

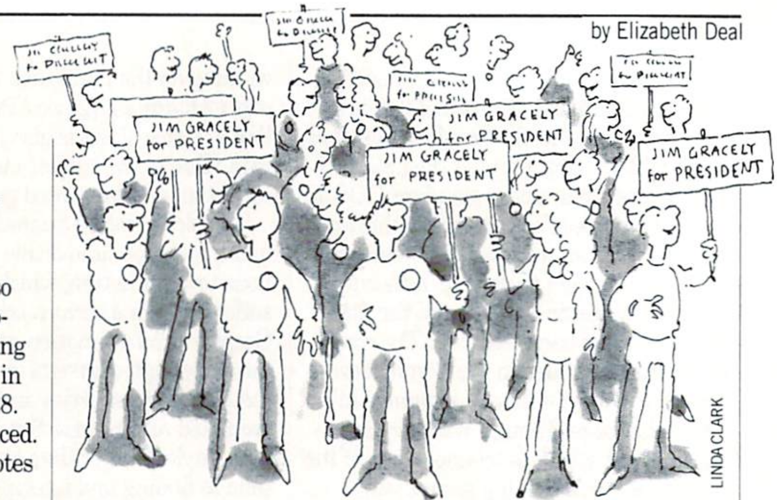
Wizardry: Strong characters are vital, so reroll until you get ones with at least 18 bonus points to spend. To open Chests, put a Thief with Agility 18 in the party's fourth slot. Stay near the entrance of the first maze, battling monsters in the two rooms there until your party reaches level three or higher; then try mapping the rest of the maze. Even if you don't want a Bishop in your party, create one and keep him in the Training Grounds, then bring him into a returning party to identify items without paying a fee. And be sure to back up your characters after each important discovery or advance in level!

Police Quest: There are only a couple of tight spots here, but the trickiest one (for me, anyway) was getting rid of Marie in the hotel room. All you have to do is use the phone to call someone. Dial information if you don't have the number. ■

by Elizabeth Deal

Election

A simple program for monitoring your school or club elections.



LINDA CLARK

Election is a serious and fairly popular American game, so when it is time to vote at school or in your club, this program might be helpful. It permits conducting an election using the computer as a voting machine. The program should run in any Commodore machine: PET, VIC-20, 64, Plus/4, 16, or 128.

Just as in real voting machines, the winner is not announced. The voting machine simply calculates the total number of votes the candidate received. Election supervisors can do the rest. Also, just as in a real situation, the computer is not a voting policeman: people will have to keep track of their registration lists, enabling the voting process, etc. (details below).

The program is fairly flexible. It permits voting for up to 20 different offices. Each office may have up to nine candidates running, and you can specify how many to vote for in the particular race ("vote for one," "vote for three").

The example data at the end of the listing has lots of candidates with elegant names, such as VP1, PRES1, BCS and so on. Why? So you can debug the program in a jiffy and then substitute real names. The P people run for the President, the V people run for the Vice-President, and so on. In school, there ought to be an election for blackboard cleaners, in our situation you may vote for three.

Typing programs from magazines is no joy, mistakes do creep in. So do not enter new candidates' names until you run this program several times to make sure that all combinations work. Most importantly, correct names must fall in correct categories. You'll know you've messed up if PRES2 suddenly falls in a table of TREASURERs. Due to the way BASIC parses DATA lines, you have to be careful. If you wish to enter "Jim Gracely, Editor" as your favorite presidential candidate, do so in quotes. Otherwise, BASIC will strip J and G, and "Editor" will become still another candidate, messing things up rather badly.

Instructions

The following graphic characters are used: in line 180 precede "VOTER" with the clear-screen character. Line 230 needs a clear-screen character in quotes just before R$(I). In line 370 place one cursor-down just before "ENTER". In line 390 type one cursor-down just after RETURN.

RUN the program. When all is well, substitute real names in the DATA lines. Vote by answering the questions on the screen. This requires only pressing the number keys and pressing the RETURN key after a choice.

The STOP key is disabled by lines 130 and 700-705. Until you're sure that you have typed the program correctly, put a REM in line 130, otherwise the program will be difficult to stop.

To begin voting, the voting supervisor must enter a three-letter code. A school teacher I know insists that this is vital, otherwise some silly kids will try to vote more than once. The three-letter code is currently EGD (line 610), but must be changed to another three-letter sequence to keep it unknown. Should you wish to remove this feature, set Q$ in line 610 to " " (null). If you do so, *any key* (just one tap) will enable voting.

The program clears the screen after each voter has gone down the list. Tabulations can begin between the voters, when the attendant presses the dollar sign ($). You can change that, of course—it's in line 640 (ASCII value 36). The program does not permit you to vote frivolously, nor to vote for a person more than once in the situation where you may vote for, say, three different candidates. Pressing an asterisk instead of a candidate number indicates "not voting for this bunch."

A voter can change his or her mind any number of times, but hesitation is allowed only until the RETURN key is pressed. So you can type: 1 2 4 2 3, changing your mind between numbers. But once you press RETURN, there is no changing. The last value gets registered, the screen clears immediately, and you can begin voting for the next office. In this last example candidate number three receives the vote.

One final note: Should there be a mishap in the voting process, the results need not be lost. If you do not modify the program, CLR, RUN, or do anything to wipe out the variables, you can get partial results of the day by typing "GOTO 210". You can then jot down the results, RUN the program again, and add the partial results later. I suspect that getting partial results during the election day may not be a bad idea. I will leave the logistics of how best to handle tragic circumstances to you. Above all, beat on this program, test it, play with it until you're sure it's doing exactly what you want done. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Election

```
110 REM SAVE"Ø:ELECTIONS",8'BGKB
130 REM TRAP 7ØØ :REM +4,C16,B128,
    C128'BCTE
135 REM---MAIN PROGRAM'BOHH
14Ø NP=2Ø:M=9:REM MAX POSITIONS,
    CANDIDATES/OFFICE'DNNL
15Ø DIM R$(NP),MX(NP),TC(NP),N$(NP,M),
    T2(NP,M)'BNYJ
16Ø GOSUB 54Ø:REM READ IN DATA'COMF
17Ø NV=1'BDJD
18Ø PRINT"[CLEAR]VOTER #"NV:EF=Ø
    :GOSUB 61Ø:IF EF GOTO 21Ø'FQBM
19Ø V=-1:GOSUB 23Ø:REM VOTING'ENXJ
2ØØ NV=NV+1:GOTO 18Ø'DJXA
21Ø V=Ø:GOSUB 23Ø::REM PRINT
    RESULTS'DUKE
22Ø END'BACX
```

Continued on page 62

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Continued from page 60

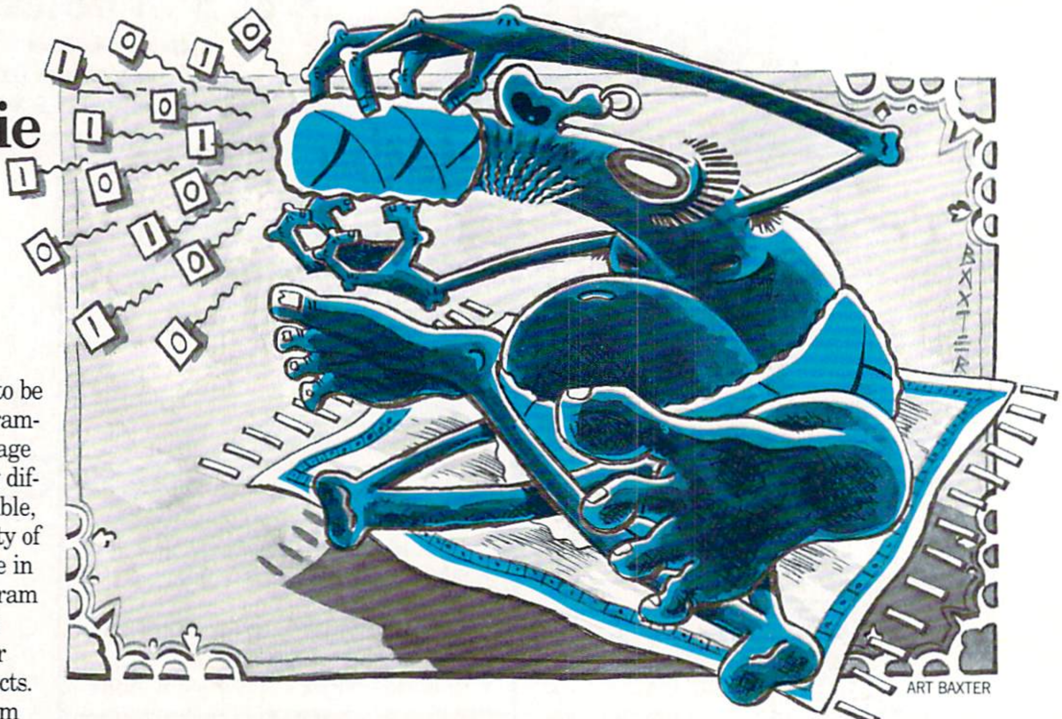
```
225 REM---VOTING SCREEN OR
    RESULTS'BYCK
226 REM   IF YOU HAVE 'PRINT USING'
    YOU CAN MAKE THIS NICER'BPDQ
230 FOR I=1 TO NP:PRINT"[CLEAR]
    "R$(I)'EKBE
240 IF V THEN PRINT"VOTE
    FOR"MX(I)'DGVF
250 PRINT'BACB
260 FOR J=1 TO TC(I):PRINT RIGHT$("
    [SPACE2]"+STR$(J),2)" "N$(I,J);
    'HXSL
270 IF NOT V THEN PRINT T2(I,
    J)"VOTES";'EJWJ
280 PRINT'BACE
285 NEXT J'BBDJ
290 IF V THEN GOSUB 360
    :IF EF THEN RETURN'GHAK
300 IF NOT V THEN GOSUB 320'EEGA
310 NEXT I:RETURN'CCVY
315 REM---ANY KEY; IF YOU HAVE 'GET
    KEY' YOU CAN USE THIS HERE'BTBQ
320 PRINT:PRINT"PRESS ANY KEY";'CCEE
330 GET I$:IF I$>""GOTO 330
    :REM EMPTY KEYBOARD QUE'FANJ
340 GET I$:IF I$=""GOTO 340
    :REM NOW WAIT FOR KEY TO
    CONTINUE'FHTM
350 RETURN'BAQC
355 REM---ADD POINT IF LEGAL VOTE'BWEN
360 V$="":P=0'CFBF
370 PRINT"[DOWN]ENTER A NUMBER AND
    RETURN OR PUSH *"'BAKN
380 PRINT"FOR NO VOTE.[SPACE2]
    YOU CAN CHANGE YOUR MIND"'BAVP
390 PRINT"BEFORE PUSHING RETURN[DOWN]"
    :REM MESSAGE FITS IN
    40COLUMNS'CXFT
400 FOR K=1 TO MX(I):REM GET VOTE'EPUE
410 IF MX(I)>1 THEN PRINT"#"K;'EIYD
420 PRINT"YOUR VOTE: ";'BBCD
430 V$=V$+CHR$(P+48)'EJFF
440 GET I$:IF I$=""GOTO 440'EITG
450 AV=ASC(I$):IF AV=42 THEN
    RETURN'GLRJ
460 IF AV=13 THEN GOSUB 1000
    :GOTO 490'FMPJ
470 AV=AV-48:IF AV<1 OR AV>TC(I)GOTO
    440'HUDO
480 PRINT I$" ";:P=AV:GOTO 440'DLRK
490 NEXT K:RETURN'CCXI
495 REM---ONE VOTE ONLY,
    CHECK LEGAL NUMBER'BGWV
500 OK=-1:REM CAN'T VOTE TWICE
    CHECK'DXKH
510 IF V$=""THEN RETURN'ECKC
520 FOR L=1 TO LEN(V$)'EGAE
525 IF P=ASC(MID$(V$,L,
    1))-48 THEN OK=0:PRINT"?! ";'ISOP
530 NEXT L:RETURN'CCYD
535 REM---BUILD TABLES FROM DATA
    LINES'BCKP
540 NP=0'BDCE
550 READ V$:IF V$="*"THEN RETURN
    :REM ALL DATA READ IN'GTRM
560 NP=NP+1:R$(NP)=V$:READ MX(NP)'EVHM
570 M=0'BCVH
580 READ V$:IF V$="*"THEN TC(NP)=M
    :GOTO 600:REM SUBGROUP READ
    IN'HGXT
590 M=M+1:N$(NP,M)=V$:T2(NP,M)=0
    :GOTO 580:REM LOOP FOR MORE IN
    SUBGROUP'GABY
600 GOTO 550:REM ALWAYS LOOP TILL
    FINAL *'CYQH
605 REM---VOTE ENABLE CHECK,
    END VOTING DAY'BGRO
610 Z$="":Q$="EGD":REM ENABLE VOTING
    BY 3-LETTER CODE'DHTM
620 FOR J=1 TO LEN(Q$)'EGSF
630 GET W$:IF W$=""GOTO 630'EIWH
640 IF W$="$"THEN EF=1:RETURN
    :REM $QUITS ALL VOTING - YOU CAN
    CHANGE THIS'GOXS
650 REM PRINT W$;:REM ENABLE FOR
    TESTING BY REMOVING 'REM''BSHR
655 IF Z$=Q$ THEN RETURN'EEAN
660 FOR K=1 TO LEN(Q$):IF W$<>MID$(Q$,
    K,1)THEN NEXT K:GOTO 690'LWKR
670 Z$=Z$+W$'CGKJ
675 NEXT J'BBDM
680 IF Z$=Q$ THEN RETURN'EEAL
690 PRINT:PRINT"[UP,SPACE4,UP]"
    :GOTO 610:REM BAD CODE,ERASE,
    RETRY'EAOT
695 REM---STOP DISABLE ... YOU CAN DO
    YOUR OWN THING HERE'BQDB
700 REM IF ER=30 THEN RESUME
    :REM STOP KEY DISABLE +4,C16,B128,
    C128'BBVO
701 REM PRINT"ERROR" ER,
    ERR$(ER)" IN LINE"EL:END
    :REM +4,C16,B128,C128'BRLQ
709 REM---STRUCTURE OF DATA YOU CAN
    FILL IN'BFJT
710 REM WHO,VOTE FOR HOW MANY,
    LIST OF NAMES,STAR,
    STAR AT THE END'BXWQ
720 DATA PRESIDENT,1'BLQG
730 DATA PRES1,PRES2,PRES3," PRES4,
    MD",*'BUSL
740 DATA VICE PRESIDENT,1'BPFJ
750 DATA VP1,VP2,VP3,VP4,*'BRPK
760 DATA SECRETARY,1'BLUK
770 DATA SEC1,SEC2,SEC3,*'BQMM
780 DATA TREASURER,1'BLGM
790 DATA TREAS1,TREAS2,TREAS3,TREAS4,
    TREAS5,*'BLDU
800 DATA BLACKBOARD CLEANER,3'BTKH
810 DATA BC1,BC2,BC3,BC4,BC5,BC6,
    *'BAIJ
820 DATA *'BBWE
830 REM-----------------------------'B
    DWK
1000 GOSUB 500:IF OK THEN T2(I,
     P)=T2(I,P)+1:PRINT"..."P
     :RETURN'HYAD
```

END

by Royal C. Jones

Binary Mind Reader and Lie Detector

for the Commodore 64



ART BAXTER

The binary number system seems to be a major stumbling block for programmers who wish to try assembly language programming. There is really nothing difficult about binary numbers. The trouble, I think, is that they lack the familiarity of our decimal system. With this premise in mind I set out to write a tutorial program for my twin nephews, who are always pleading incompetence when I look for help with my machine language projects. My idea was to write a BASIC program that would satisfy their passion for games while craftily instilling the principles of the binary number system. The result was the modestly titled "Binary Mind Reader and Lie Detector."

In lines 10-80 the screen is cleared and the user is asked to think of a positive integer. If it turns out that the user's number is something else, the program simply points out the error and suggests another try (lines 490 and 500).

The program now asks a series of questions in the form "Is your number less than ______?" With each answer it shows the progress of its reasoning by making a deduction about the number. The deductions become more and more specific until finally the number itself is found. The program asks 2N−1 questions about a number that is N bits long and will accept numbers up to 29 bits long, for a decimal maximum of about a thousand million (one billion, American style). Of course, with numbers of that length the whole process becomes a little tedious, so it is best to remain in the lower ranges. The input of answers is speeded up by the use of a live keyboard subroutine in lines 630-670.

Lines 90-220 find the range in which the number falls by determining its length in bits. The final value of the variable I determines that the number is less than 2 to the Ith. The variable is then decremented by one (line 250) to point to the first bit of the number. In lines 250-380 the number is pinpointed by means of a binary search, and in lines 390-440 the result is announced. If it is correct, the program rather smugly signs off. If not, we proceed to the Lie Detector.

The Lie Detector essentially repeats the binary search of lines 250-380, this time using the variable T (for test number) to construct the final result. At each stage in the search the variable T is compared with N, the number originally deduced, and with W, the number claimed by the user. If at any point N and W do not agree with respect to T, the lie is discovered. The program does not bother with cases of more than one lie since one is enough to ruin your credibility. To test the efficiency of the Lie Detector, try telling just one lie in the course of the questioning and make a note of it. The Lie Detector should zero in on that exception.

If the program makes it through the Lie Detector and hits line 600, something is drastically wrong. Either someone has copied the program incorrectly, or my nephews will be hopping with glee at having crashed my elegant tutorial. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Binary Lie Detector

```
10 REM  BINARY MIND READER'BQVC
20 REM  AND LIE DETECTOR'BOYC
30 REM  BY ROYAL C. JONES'BOKD
40 PRINT"[CLEAR]"'BATB
50 PRINT"THINK OF A NUMBER--"'BACG
60 PRINT"A POSITIVE INTEGER,
   PLEASE"'BAIJ
80 REM  FIRST HOW BIG IS IT?'BQDJ
90 N$=" 1":REM  THE BINARY NUMBER'CSXL
100 FOR I=1 TO 29:REM  LOTS OF
   BITS'EPQB
110 N$=N$+"Ø":PRINT'DFRY
120 PRINT"IS YOUR NUMBER LESS
   THAN"'BAQE
130 PRINT N$" BINARY"'BCUA
140 PRINT 2^I"DECIMAL?"'CCWC
150 GOSUB 620'BDLB
160 IF A$="Y" GOTO 240'DFBE
170 PRINT"THEN IT IS AT
   LEAST"I+1"BITS LONG"'CCAL
180 D$=D$+"[SHFT Z]":REM  PLACE
   MARKERS'DRXK
190 NEXT I'BBCE
200 PRINT"LET'S NOT GET CARRIED
   AWAY!"'BAVD
```

```
210 PRINT"THINK OF ANOTHER
    NUMBER--"'BAKE
220 GOTO 80'BCPX
240 REM  NOW FOR THE NUMBER
    ITSELF'BVSG
250 N$=" 1":I=I-1:N=2^I'FKAH
260 IF N=1 GOTO 380:REM  NO
    QUESTION'EQOI
270 FOR J=I-1 TO 0 STEP-1:PRINT'HGFI
280 PRINT"YOUR NUMBER LOOKS LIKE"'BAIK
290 PRINT N$;LEFT$(D$,I+2-LEN(N$));
    'FPGL
300 PRINT" BINARY"'BAGY
310 PRINT"IS YOUR NUMBER LESS
    THAN"'BAQF
320 PRINT N+2^J"DECIMAL?"'DDPD
330 GOSUB 620'BDLB
340 IF A$="Y" THEN N$=N$+"0"
    :GOTO 360'GKLH
350 N$=N$+"1":N=N+2^J'FJFH
360 NEXT J'BBDD
380 REM  EUREKA!'BHIH
390 PRINT:PRINT"THE NUMBER YOU ARE
    THINKING OF IS"'CBHQ
400 PRINT N$" BINARY"'BCUA
410 PRINT N"DECIMAL"'BBUB
420 PRINT:PRINT"AM I RIGHT?"'CBWE
430 GOSUB 620'BDLC
440 IF A$="Y"THEN PRINT"AS ALWAYS"
    :END'FDFI
460 REM  THE LIE DETECTOR'BONI
470 PRINT:INPUT"WHAT IS YOUR NUMBER";
    W'CDPM
480 IF W=N THEN PRINT"AHA! JUST AS I
    SAID":END'FDCO
490 IF W<>INT(W) THEN GOSUB 1000
    :END'HJGN
500 IF W<1 THEN GOSUB 1100:END'FHRD
510 T=2^I:REM  THE TEST NUMBER'DRAG
520 IF W<T GOTO 580'DFPE
530 FOR J=I TO 0 STEP-1'FEFG
540 IF N>=T+2^J THEN T=T+2^J
    :GOTO 570'KMBM
550 IF W<T+2^J GOTO 590'FHCI
560 PRINT"AHA! BUT YOU SAID IT WAS
    LESS THAN":PRINT T+2^J:END'FFMS
570 IF W>=T GOTO 590'EFQJ
580 PRINT"AHA! BUT YOU SAID IT WAS
    NOT LESS THAN":PRINT T:END'DDBT
590 NEXT J'BBDI
600 PRINT"OH-OH! BAD PROGRAM":END'CBCF
620 REM  INPUT SUBROUTINE'BPVH
630 PRINT"(Y/N)...";'BBPF
640 GET A$:IF A$=""GOTO 640'EIFI
650 PRINT"[RVS]"A$"[RVOFF]"
    :REM  HILIGHT ANSWER'CQSL
660 IF A$="Y" OR A$="N" THEN
    RETURN'GEUL
670 GOTO 630:REM  ODD RESPONSE'CPXM
1000 PRINT"BUT I ASKED FOR AN INTEGER"
     :PRINT"TRY AGAIN":RETURN'DCSE
1100 PRINT"BUT I ASKED FOR A POSITIVE
     NUMBER":PRINT"TRY AGAIN"
     :RETURN'DCYH
```

END

TAKING THE BYTE OUT OF ROBOTICS

by John Jermaine

Although robotic and electronic technology is all around us—in everything from toll booths to washing machines—most people take this technology for granted. Two men have set out to change this with a fascinating electro-mechanical construction kit called The Robotic Workshop.

You hear a lot about "robotics" and "electronic technology" these days because they're progressively re-shaping the world around us. Factory machinery, for example, can now perform jobs (in minutes) that once took several people all day to complete. Satellites beam transmissions around the world, photograph a section of the planet in minutes, and even have the ability to change their own orbits. Isn't it incredible that these complex devices are actually controlled by computers and keyboards hundreds of miles beneath them? On the home front, the consumer is surrounded by remote control televisions, microwave ovens, burglar alarm systems, etc.

Yes, high technology is all around us, but the public in general is electronic and robotic illiterate. To illustrate my point, try to answer the following questions:

- How does a burglar alarm operate?
- Do you know the difference between a motor and a generator?
- What is feedback?

Don't feel bad if you can't answer these questions, because the average computer user can't answer them either.

Bruce Carver and Steve Witzel are engineers with a common goal: They want to deliver the basic principles of advanced technology to 64 owners everywhere. The Robotic Workshop is their first educational collaboration, and this feature is an introduction to a great adventure—using your imagination.

John Jermaine: Can you give me some background information about yourselves?

Bruce Carver: During the course of my 39 years, I've had a very busy schedule. I earned a degree in engineering, founded Access Software, and worked on a series of games including: *Raid Over Moscow, Beach Head, Leaderboard,* and *Tenth Frame.* Aside from the game projects (and taking care of company business) I've always wanted to create a special line of products that would help people learn about many devices we commonly take for granted. Steve Witzel had a similar idea, so we put our heads together and co-founded Multibotics, Inc.

Steve Witzel: I'm Steve Witzel, the 41-year old president of Multibotics, Inc. My background is very similar to that of Bruce Carver. Both of us have engineering degrees and large families (I have nine children myself). We've also worked with practically every microcomputer on the market at one time or another. While Bruce takes care of the educational element in Multibotics products, I'm the tinkerer who dreams up many of the projects and puts them together in a package.

Jermaine: What led to the formation of Multibotics, Inc.?

Carver: Back in August 1982, I had finished my education and was working for a local engineering firm. My boss knew I had taken a Fortran course in college, so he reasoned I was the perfect person to be operating the company's new 16-bit computer. This meant I would have to learn assembly language very quickly. No one else at work knew anything about com-



CHARLES BARTHOLOMEW

puters, so I thought I had stumbled into a bad situation. As luck would have it, I decided to purchase a microcomputer to study assembly language at home. Steve Witzel owned the computer store I visited, and he sold me my first Commodore 64. After talking with him for a while, I discovered that we had similar views on many issues. This simple transaction had brought us together, with Steve contributing to Access projects long before Multibotics officially existed. He also gave me the benefit of his business knowledge as I was forming Access Software.

Witzel: Yes, Bruce and I have been friends for a long time. Over the years, we had discussed the possibility of generating a home tutorial for people who have a fear of computers. This product would demonstrate the relationship between computers and external devices, while giving the user a crash course in fundamental electronics. The package would also have to be economical, easy to understand, and entertaining enough to hold the interest of both children and adults. If we did our homework correctly, the product would entice you to complete every project in the manual and encourage you to conduct some experiments of your own. That's when the fun really begins if you enjoy tinkering like I do. We founded Multibotics, Inc. in June of 1985 to take these basic ideas and turn them into something tangible. The first Robotic Workshop kits were assembled and shipped on April 25, 1986.

Jermaine: What exactly is the Robotic Workshop?

Witzel: Actually, two different versions of the Workshop are currently on the market. The MB230 package was specifically designed for home use. It contains three basic components: (1) 32 Capsela parts (including two motors, one worm gear, a transmission, an axle, wheels, etc.), (2) a special B100 computer interface unit, and (3) a manual written in common language.

We developed the MB230T kit for teachers involved in technology education. Several years ago, approximately 20% of high school/middle school students were taking courses in wood working, metal shop, or some other form of Industrial Arts. Today 100% of the students are learning the basic principles of technology. The mechanical pieces of both Workshops are identical, but the MB230T package contains a teachers manual (with overhead transparency masters), student manuals, a computer interface cable that is more rigid than before, and a shipping container was re-designed for use in a classroom environment.

NASA engineers recently purchased several of our units. We'd like to know what they're doing with them.

Jermaine: Why did you decide to use Capsela® components in Multibotics products?

Witzel: In order to create a line of supportive building pieces, it would have cost us millions of dollars. While all of that work was being done, the release of the Workshop would have been postponed indefinitely (leaving the market wide open for someone else with a similar product). We avoided this possible disaster by looking through the toy stores of Utah for an established set of flexible components that were readily available throughout the country. Bruce and I examined many "build-it-yourself" pieces, but each of these systems lacked the degree of flexibility our projects demanded.

Capsela was our final choice for several reasons. First of all Play-Jour, the maker of Capsela products, manufactures the most adaptable building components we could find. To illustrate this point, let's talk about the gear capsules. They come in multiple gear ratios that allow us to run a motor very fast, or to gear it down to almost any desired speed. The gear is also encased in a plastic bubble to protect it from being damaged. I haven't found a comparable piece on the market that could equal the performance and design advantages of this capsule. Play-Jour has also developed a large base of Capsela parts, with new pieces being released at regular intervals. This factor was very important because it guaranteed a steady flow of new material for the user.

I should also point out that Play-Jour has been extremely helpful by supplying us information about existing Capsela components, parts coming to the market, and pieces that are presently on the drawing board. Some time ago, we needed a turn coupler to make the front wheels of our vehicles move more realistically. Bruce and I designed the piece and contacted Play-Jour to see what they thought of the idea. To our surprise, They showed us their version of a similar product which hadn't been released yet. This little tip saved us thousands of dollars in the long run.

Jermaine: What was your original thinking as you created the Robotic Workshop?

Carver: The Robotic Workshop concept was largely my idea. I really enjoy taking complex engineering principles and simplifying that information for the people



Loading cable on Robotic Automatic Cable Cutter.



Final test and inspection of B100 interface using another B100.



Steve Witzel (left) and Bruce Carver showing off new packaging for Robotic Workshop school version.

around me. By doing this, I find myself involved in some stimulating conversations, where individuals voice their opinions on issues they've probably never discussed before. Everyone's a winner when this takes place.

My robotic experience includes engineering work with the designing of automated systems, instrumentation, and controls for local oil refineries. So I've seen how useful computers can be when they're communicating with devices in the real world. People tend to forget that a computer can perform millions of calculations in mere seconds (making it an ideal monitoring device). Even microcomputers have the ability to perform complex tasks in a home environment, requiring only a limited number of additional pieces. The Robotic Workshop proves this statement. It contains a working D.C. voltmeter and oscilloscope, but the unit can be expanded to create more advanced equipment.

Witzel: From the beginning, we wanted the first Multibotic product to be a very versatile base unit (something we could issue expansion modules for at a future date). This unit would give the consumer a valuable package of useful equipment, at a price he could afford. Expansion modules would also be priced to sell. It's a shame that most microcomputer "add-ons" tend to cost the consumer an arm and a leg.

As this concept slowly began to take shape, Bruce and I had to develop a special group of projects that were geared to the interests of the average user. We wanted our followers to construct a series of working models, that exhibited the characteristics of different modes of transportation. Two of our automobiles, for example, have unique steering capabilities. Another vehicle demonstrates the principles of high torque four wheel drive, while the Multibotic copter displays how a stabilizer blade interacts with the main blade of the craft to produce a smooth lifting force. Other projects examine light, color, feedback, electronic speech, etc.

> Many school systems have purchased the Multibotic Workshop, but a larger number of teachers are paying for the units out of their own pockets.

A final thought came to mind. What could we do for the consumer who wanted to use his Robotic Workshop as a practical piece of equipment? There were some extra components on the circuit board, so we decided to use them. We played around with a number of different speech technologies and finally came up with a delta modulation scheme which produced high quality results inexpensively. Bruce and I also created precision instruments like

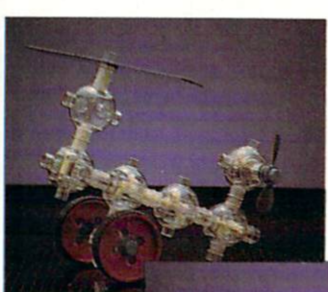
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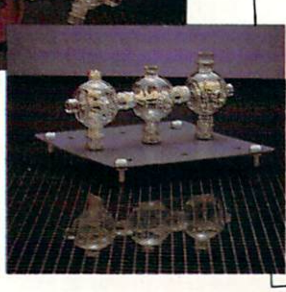
Tightrope Walker Contest

Bruce Carver and Steve Witzel encourage their customers to play with the Robotic Workshop, so they're issuing a special challenge. Diagram 1 is a new project they call the "Tightrope Walker." You won't find it anywhere else. Assemble the project and write your own program to make it do something. The person who does the best job of programming the software to operate the Tightrope Walker will receive his or her choice of any four Access Software programs. These are the rules for the contest:

1. The Tightrope Walker must be assembled following the design on the opposite page. You may add other components to the basic design, but the original pieces must all be present. You are also limited to using the remaining parts present in the Workshop kit.
2. All entries must be postmarked no later than August 31, 1988, and be present at Multibotics within the following week. We will not be held responsible for lost entries.
3. A diagram of your creation must also be sent in your package, if you've added anything to the original design of the project. You must also submit your Tightrope Walker program on a diskette. Please put your software on both sides of the diskette if possible. All entries become the property of Multibotics, Inc.
4. Bruce Carver and Steve Witzel are the judges in this contest. Their decision is final.
5. Send your entries to Multibotics, Inc., #A 2561, S. 1560 West, Woods Cross, Utah 84087.

So take this article into your computer room and get to work. If you want to do well in the contest, use your imagination to make the Tightrope Walker perform as many "Tricks" as possible. Bruce and Steve also welcome your comments about the Workshop, and hope you'll give them a call at (801) 298-9077.





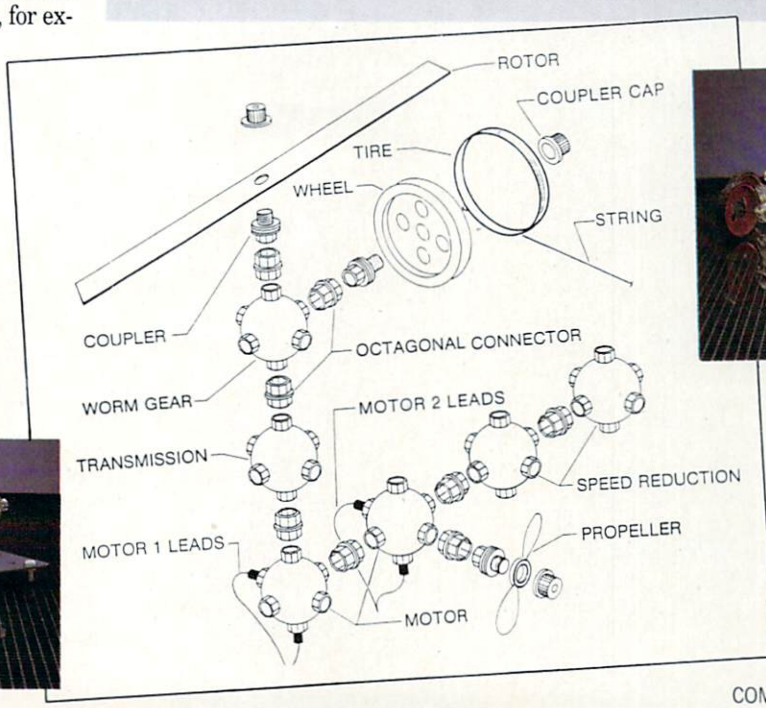
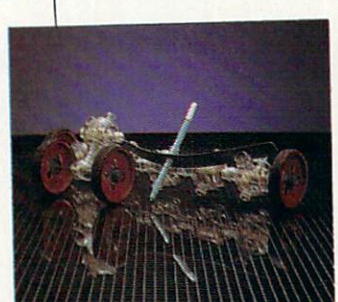


Diagram 1



Penchant for

In the world of adventure games, familiarity does not breed contempt. The more puzzles and games that you solve and complete, the more adept you will become, increasing your analytical skills both in adventures and in real life.



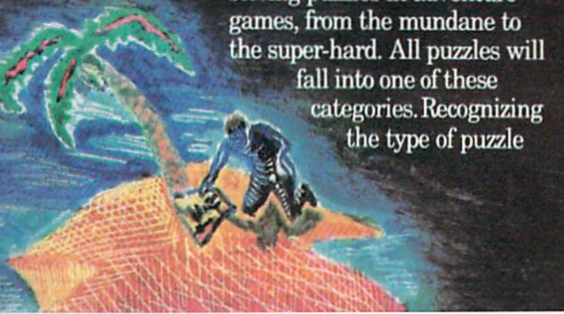
You're standing at what appears to be the end of the hallway that you've been walking through for a long time. A few minutes ago, you were attacked by an orc with an appetite for destruction. After a fierce battle, you braved some scars to leave a pile of dead orc flesh in the middle of the floor. Now, the walls have quickly sloped downwards ending at a door about two inches high. You can't go back down the corridor because a wizard put a magical wall in your way. Your only possessions are a lantern, a sword and some money. What will you do?

This situation is typical of many that you will encounter while playing adventure games. Whether the problem is a quickly-shrinking wall, an attacking monster or a locked door, one thing that all of these have in common is the word "puzzle." Puzzles are the essence of adventure games; you must solve them to further your stay in the world contained on the disk. How well you perform in an adventure game is directly related to your puzzle-solving abilities. Some adventure games have very simple puzzles, whereas others contain a few cliff hangers that will have the most avid adventurer stumped for weeks. Puzzles reflect the atmosphere, characters and objects of the specific game, but they can be broken down into five main types.

The above situation falls into one of these five categories, as we will soon see. After exploring your surroundings more carefully, you find a pouch on the orc that contains some more money and a wand. Thinking that the wand may end your predicament, you point it at the door only to see the door become even smaller. Although disastrous, this reveals a possibility.

Restarting from a previously saved game, you instead point the wand at yourself. After greatly reducing your height with the magic wand, you easily slip through the door to journey further in the adventure. This is a magic-based puzzle. Solving it required intelligent, rather than haphazard, use of a magic item.

Besides magic-based puzzles, there are four other types of puzzles associated with computer adventures: logic puzzles, mazes, object-oriented puzzles and verbal/dialogical puzzles. Use this article as a guide for solving puzzles in adventure games, from the mundane to the super-hard. All puzzles will fall into one of these categories. Recognizing the type of puzzle



Puzzles

by Russ Ceccola

you are up against should spawn some brain action relating it to those you've seen in the past.

Mazes

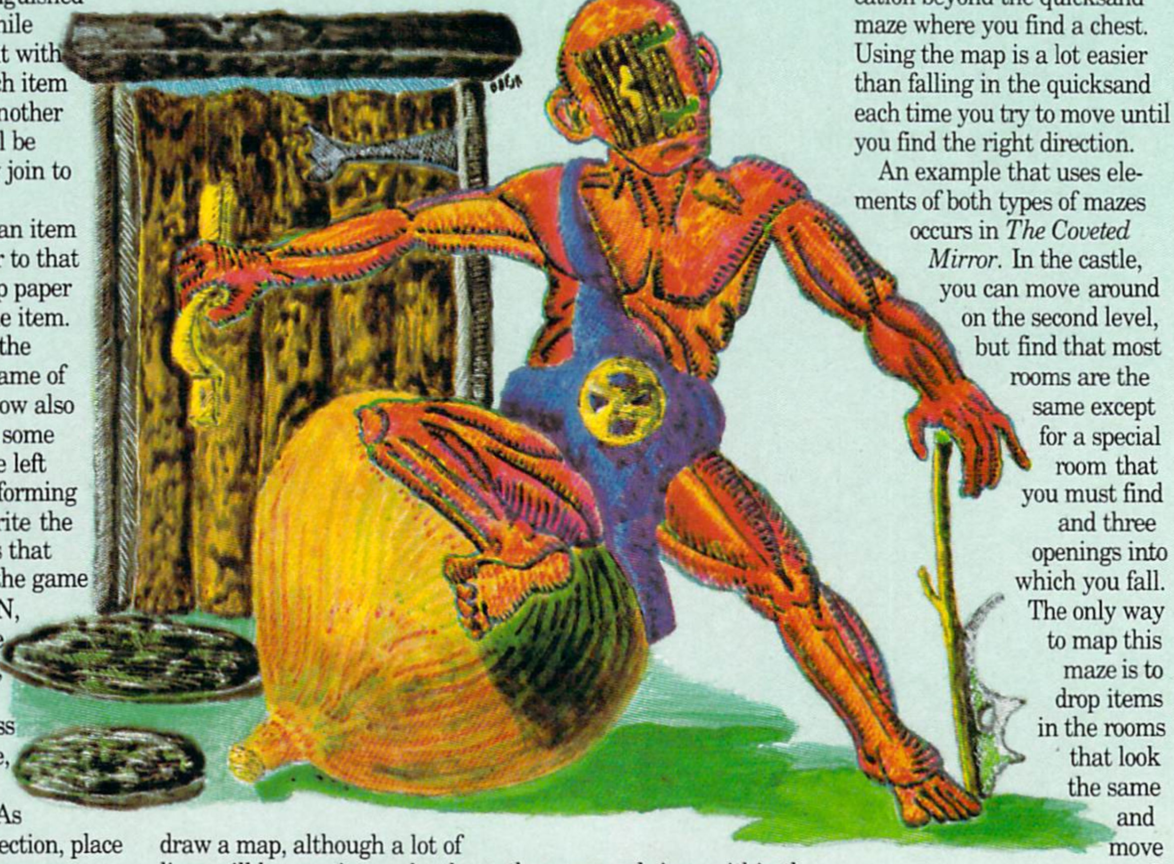
You will often be moving from location to location in an adventure game, happily mapping, when you find that no matter which direction you move, you don't return to a familiar location. Instead, you wander aimlessly, looking for a way out of these seemingly endless rooms that are all alike. Unfortunately, what you've just walked into is a maze. Some games will tell you that you are entering a maze. Others will leave that fact for you to determine. Regardless of the source of revelation, mazes are difficult to map and even more difficult to escape. There are basically two kinds of mazes: those you must map and those for which there is some way of getting around mapping the myriad of rooms.

There are many methods for getting through the first type of maze. The sneaky way is to go out and buy a hint book available for many adventure games and copy the map from the book onto the map that you have drawn. In some cases, I've found this method to be the only way out. Most mazes are simple enough to map, requiring a little ingenuity on your part.

One way to map a maze is simply to move in random directions from one room to the next, noting the directions you've taken, until you come to some familiar place. At least you'll have one way of going through the maze. This method is time-consuming and barely effective at best. Another way to traverse a maze is to go one direction and try to backtrack your steps to the room you've just left. An example would be moving northwest from the entrance in the maze and finding out through trial and error that moving south will return you to the entrance. If you then choose a direction from the second room and try to retrace your steps to the entrance, you will have a path of twice the length with which to experiment. This method works if you like to continually return to the entrance of the maze or some unique room in the maze, but all this retracing of paths translates to a lot of wasted time.



The best way to map a maze is a variation of the latter method above. You have to find some way to distinguish one room from the next. You can do this in most adventures by dropping an item of your inventory in that room. From now on, when you enter the room, you will see whatever object you've dropped. Now this room can be distinguished from the others while mapping. Start out with a lot of items. Each item that you drop is another room that you will be able to completely join to others.



After dropping an item in a location, refer to that location on a scrap paper by the name of the item. For each room in the maze, write the name of the item (which now also gives the location some uniqueness) on the left side of the paper, forming a column. Also write the possible directions that you can move in the game (some only allow N, S, E and W, where others accept NW, SW, NE, SE, UP and DOWN) across the top of the page, making an item/direction matrix. As you move in a direction, place the name of the room you enter (name of the item in that room) in the place in the matrix at the intersection of the direction you've moved and the room you came from. If the new location has no item in it, drop one and add the new room to the column on the left side of the matrix. In no time at all, you will have a matrix consisting of all possible directions from all of the locations in the maze and where they lead. Remember one more thing: don't stop mapping once you've found the exit or a special room. Continue to map until there are no more directions; otherwise, you may miss more special rooms. Ultimately, the matrix will act as a guide to physically drawing the maze on your map.

An example of the above type of maze can be found in *Adventure*. Popularly referred to as the "vending machine maze," you will eventually find a useful vending machine somewhere in the maze. You must map the maze; there is no shortcut. Using the above matrix method, you'll be able to draw a map, although a lot of lines will be crossing each other in your picture. This problem tends to happen a lot in drawing the maze after you've mapped it. Where you place the rooms on the paper determines how easy it is to connect them with lines. Experimenting with orientations will result in economical solutions, but the best bet is to just use your matrix until you can find a professionally drawn version of the map. At this point, copying a map from a hint book or solution book is not considered cheating. After mapping the maze in *Adventure*, you can begin to solve the puzzle surrounding the vending machine.

The second type of maze has some way of getting around the whole mapping tedium. These mazes require some object or special item that allows quick travel in the winding passages. Some aids that have appeared in games are maps that appear on the screen, lists of directions to get through the maze, items that move or point you through the maze and signs within the maze pointing you in the proper direction. If you think that such an item exists in a game with a maze, don't try to map the maze; rather, use your intelligence to activate the item or interpret its instructions. More often than not, you should be able to use this maze-revealing object by solving another puzzle or by simply examining the effects of the object.

An example of this type of maze takes place in *Mind Shadow*. You are on a desert island and find a piece of paper at the bottom of a cliff with a big X on it and a number of strange symbols in two lines, with the X at the end of the second line. By thinking, you should realize that the paper is some kind of map (remember "X marks the spot"). Examining the symbols carefully, you see that they are arrows pointing in one of four directions. Taking this to the edge of the quicksand and moving in the directions of the arrows on the paper takes you to a special location beyond the quicksand maze where you find a chest. Using the map is a lot easier than falling in the quicksand each time you try to move until you find the right direction.

An example that uses elements of both types of mazes occurs in *The Coveted Mirror*. In the castle, you can move around on the second level, but find that most rooms are the same except for a special room that you must find and three openings into which you fall. The only way to map this maze is to drop items in the rooms that look the same and move until you drop into the opening.

Try this again and again until you have a map with an entrance into each opening from all directions. Only then will mapping the rest of the maze take no more than a few minutes. The bulk was exhausted by the presence of the openings in the floor.

Mazes have plagued man from the Egyptian pyramids to the advent of the personal computer in homes across the world. (See "Historic Mazes," page 82.) By using the above hints, you should begin to feel some confidence in mapping and escaping mazes in adventure games. Not all adventure games have mazes, but for

those that do you now have some ammunition with which to fight the nasty tricks that game designers include in their adventures.

Verbal/Dialogical Puzzles

This category is currently a small one, but as more adventures are developed verbal/dialogical puzzles are becoming more prevalent. Basically, a verbal or dialogical puzzle is one that is based on what you say to another character in a game and how that character responds. The exchange continues until you decide to stop talking after gathering enough information, the game ends or the other character stops responding. Most verbal/dialogical puzzles take place in games where the responses are written to the screen, as in text adventures and response-based games, but with the recent popularity of the Amiga and its speech options, designers have made games in which the characters speak to you in a natural voice. The use of speech makes deciphering this type of puzzle easier.

The most important thing to remember in solving verbal/dialogical puzzles is to type in a question or choose a sentence that will elicit the most useful response from the character who needs to be addressed in solving the puzzle. You don't want to anger the character. Rather, you should say things that the character wants to hear. Following this method will reap the most benefit, whether it involves passing a gryphon by answering a riddle in *The Crimson Crown* or gathering information by talking to suspects and witnesses in *Perry Mason* or *Deadline*. Often, you are limited in possibility by a parser or the available responses in a game. In this case, choose your words or a response to best solve the puzzle.

Law of the West is a perfect example of the use of verbal/dialogical puzzles. This western adventure consists of a series of screens in which characters enter the screen and talk to you. You have five choices of responses at the bottom of the screen. Choosing the right one raises your score. At one point, a lady walks onto the screen and says, "Well, hello there, big boy." Two of the possible responses are: "Uh, hello, Miss Rose," and "Get off the street, you painted jezebel." Making the second choice causes Miss Rose to answer "Who are you to be talkin', liver lips?" indicating that you should try a softer approach. By making the first choice instead, you inspire "I like the strong, silent type," from Miss Rose. Your romance score increases through better use of reasoning.

> Puzzles reflect the atmosphere, characters and objects of the specific game, but they can be broken down into five main types.

This type of mindset is what you must acquire to solve verbal/dialogical puzzles. Just keep in mind that you are trying to gain information from the character and that the character should be treated as a real person and you'll do fine. Often, posing the correct question is more important than furnishing the correct response to the other character's comments. Questioning is more apparent in mystery games because of their nature and because this might be the only way to solve the mystery, aside from evidence. Again, you are limited by the parser in the game, but you can rest assured that there must be some proper question because, if there weren't, there would be no puzzle to solve and no adventure to play.

Alien Fires, 2199 A.D. contains a good example of choosing the correct question to pose to a character. At the start of the game, you have no weapons, no armor and no other useful items. Obtaining an inventory produces a big nothing. You can talk to characters you meet in the game by typing in a question or something you want to say. Knowing that you need a weapon to get past a certain character and the door behind him, you ask one character about weapons. In particular, you ask Dr. Fever for a weapon, and he tells you that Mangle Tangle has some. You have solved the puzzle of finding a weapon by verbal/dialogical means.

Puzzles involving speech, responses and questions come in many different forms, but the almost exclusively common characteristic is the presence of another character in the adventure other than yourself. Examination of the character is very important in solving these puzzles. Look at the character (if represented graphically on screen), read his/her/its description carefully, note any peculiarities or special characteristics of the character and experiment with questions and responses. That's about all you need to know to solve verbal/dialogical puzzles, easily one of the more interesting types of puzzles in adventure games, because they cause you to bring your own mind and thinking power directly into the reality and happenings of the adventure.

Magic Puzzles

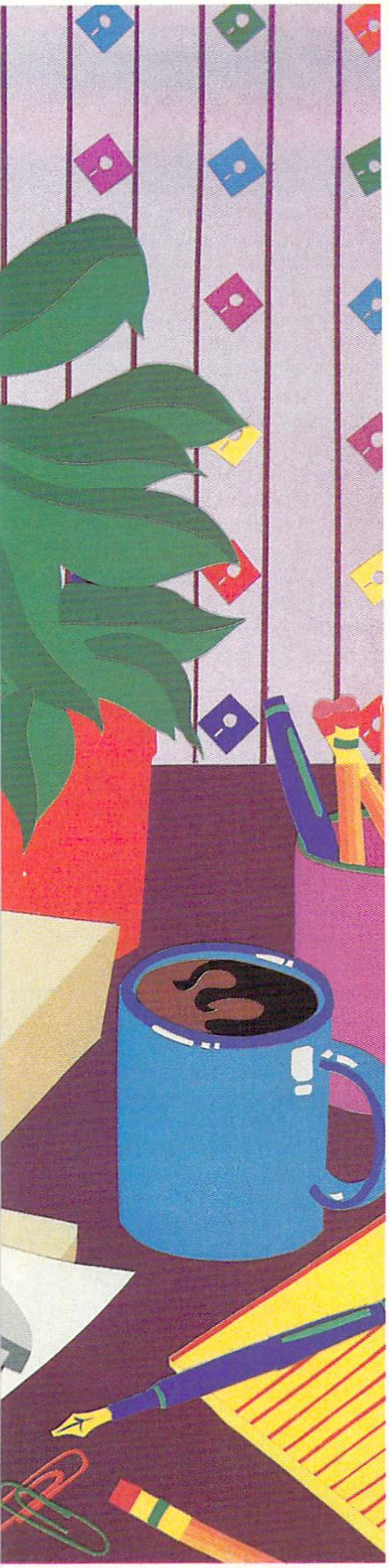
Puzzles involving the use of magic are some of the most popular in adventure games and are predominantly used in the realms of fantasy and science fiction. Unless obvious hints are given by the adventure, solving magic puzzles takes a lot of practice and requires a good memory. Not only do you have to know what to do with a magic item or how to use a magic spell, but you also have to remember what magic you have at your disposal. It's a good idea to write down everything you find out about the use of magic in an adventure. It makes replaying the game later a lot easier, and it narrows down the possibilities for the real use of the magical spell or item.

Illusions and magic have fascinated man from the alchemists in the Middle Ages to Houdini to the great magicians of today. What exactly is it that attracts people to magic? A fair description would be that the power that is seemingly exhibited by the magic trick or illusion touches a special area in all of us that wants to do the impossible. Therefore magic is cathartic; by watching magicians, we see our fantasies come to life. It's the same case on a computer, except that *we* are actually performing the magic, albeit artificially. What better place is there to perform stunning feats than on a computer? Many game designers

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DESKTOP
THE POWER OF DESKTOP PUBLISHING
GOOD DESIGN
Commodore MPS 1250


LISA POMERANTZ

DESKTOP PUBLISHING for the 64 and 128

by Gary V. Fields

If you need to publish on a shoestring budget, you are in luck—professional desktop publishing programs for both the Commodore 64 and 128 are now on the shelves.

The first amendment to the Constitution guarantees freedom of the press—desktop publishing provides a way for each of us to exercise that freedom. The new desktop publishing programs for the Commodore 64 and 128 systems make publishing professional documents both easy and affordable.

A desktop publishing program lets the user create, proof read, edit, design and lay out entire documents (a single page or an entire book) with different type sizes and fonts, complete with graphics or photographic artwork, using the computer's monitor for display. The finished document can be saved to disk and/or printed for hard copy. The word "desktop" is used because all the activities required to create and publish are done on a single desktop—yours.

Like the engineer for the "little engine that could," programmers for the 64 and 128 systems never seem to know when they've reached their limits. Just when we all thought those two little ironhorse computers had topped their last hill, they proved us wrong once more. Now serious, affordable desktop publishing comes to the eight-bit world.

Two years ago a good friend came to see me to get my advice on desktop publishing. He operated a small calendar company where all the type and graphics were still set and printed manually. He wanted a better, faster, cheaper way to create his calendars and figured I could offer some unbiased suggestions. We made the rounds of all the computer dealers and looked at programs for the high-end machines. After he'd seen "all that money could buy," I showed him GEOS on the 64. He was impressed until I told him the retail price. He was suspicious based on reasoning like this: "At a price only a fraction of what the big guys were charging, how could a 'little' 64 and a program costing under $100 deliver the quality of a Macintosh and a program like *MacPaint*?" I explained that the major difference between the two was speed. Because the 64 has less free memory, it must access the disk drive more often (to exchange blocks of memory), and because it uses a slower CPU than that used by the new 16-bit computers, it couldn't run as fast. But, I explained, given a little more time and the right printer, the results he could get out of either would be comparable.

That's exactly the situation which exists today. Providing you have more time than money, either the 64 or 128 booted with one of the new desktop publishing programs and connected to the right printer (more about printers later) is all you need to go into the publishing business.

The differences between a desktop publishing program and a simple word processor are options and layout. A desktop publishing program provides the ability to include graphics and special text fonts, plus options to view and edit the entire document on screen before dumping it to a printer or saving it to disk. In the publishing industry this is called "pagination." The computer lets you design the document's layout on the monitor's screen instead of using manual methods. This technology became available for newspapers and magazines only a few years ago. It is amazing how quickly desktop publishing has come to market for the eight-bit systems. It is also a revealing indicator of just how quickly new technology is trickling down to the home user.

Who Needs Desktop Publishing?

This is the one question you need to answer before running out to buy a publishing program. Desktop publishing programs are ideal for creating and printing professional-looking newsletters, brochures, reports, forms, calendars, certificates, advertisements, novelettes, poems, announcements, stationery, letterheads, greeting cards, business cards or anything else which requires putting ink on paper. If you will be paying someone else to create any of those this year, read on.

Before the introduction of personal computers and desktop publishing programs, preparing documents for publication required lots of time, paper and expensive machinery. Desktop publishing programs eliminate much of the expense and almost all of the waste, and they minimize the time involved by electronically duplicating and simplifying those chores.

Before the advent of desktop publishing, editors planned publications on a dummy (blank) page. The page was divided into columns (most newspapers are divided into six or eight columns and magazines are usually divided into two, three or four columns). In the old days, text was created on a typewriter, edited with a pencil and sent to the composing department where the text was typeset and formatted into the correct column width. Graphics were handled similarly, but black and white photographs were sized and then screened (the image was converted to tiny printable dots).

When all this was done, the paper proofs of the text, graphics and photographs were cut to size, and a layer of paste or wax was placed on the back so each would stick to a master layout page. There, the text, headlines, captions, logos, graphics and photographs were grouped within and across these columns in a style which was intended to be visually pleasing and informative. When everything was in place and all the errors (they always creep in) were corrected, the entire page of text and graphics was photographed so a master plate could be made for use on the printing press.

The Power of Desktop Publishing

Desktop publishing frees you to do almost the whole design and layout process on your computer's screen. Text and graphics are created, cut and pasted all electronically. Photographs and non-computer artwork can be digitized and included just as easily.

While all desktop programs have provisions for creating and editing text directly, they also allow you to use the word processing program you are already comfortable with (providing it will save files in true ASCII format). Developers of desktop publishing programs realized most users would prefer to use a word processor they are familiar with and made provisions for the user to import files from the most popular ones. You can use the word processor of your choice and import the files you create into your publishing program, hassle free.

The same is true of any library of artwork you may have developed over the years using different graphic programs (*Doodle!*, *Print Shop*, etc.) or purchased separately (*Newsroom Clip Art*, *Print Shop Graphics Library*, etc.). Most of the popular ones can be imported directly or (using a translating utility) converted for use by the publishing program. Because of the thousands of commercial and public do-

main graphics already in circulation, the 64 and 128 desktop publisher has an almost inexhaustible source of artwork. If you'd rather create your own graphics or want to edit an existing graphic, each package now on the market includes a graphic toolbox which lets you do just that using patterns, boxes, ovals, lines and brushes.

The beauty and power of a desktop publishing program is not that it allows you to instantly mix graphics and text on the same page, but that you can overlap the two, or give one dominance over the other so they become a united, powerful, graphic statement rather than just two images on a page. Text can be formatted, justified, moved, cut, flowed between columns or pages or even changed in size or font type with a few key (or mouse) strokes—changes which were both time consuming and expensive to make in the pre-desktop era of publishing. Page layouts can be changed or completely redone time after time, with no production cost and little time lapse. You are free to change and experiment until just the right visual and informative balance is established. When you control all the variables there is no reason to go to press until you are completely satisfied with your document.

After the page layout is complete, you simply save it to disk for future use or dump it to a printer. Once your printer has reproduced the images on your screen, you are ready to either duplicate the document yourself or submit it to a commercial printer. Depending on how many copies you need and the final quality you require, you may be able to finish your publication using an office copy machine. If volume is large, you may need the services of a professional print shop. In many cases a commercial print shop can reproduce your documents more cheaply than a copy machine, and the results will always be better.

Getting Started

Providing you already have a computer, monitor, disk drive and printer, all you need to begin publishing is a program. The very first 64 program which offered desktop publishing capabilities was Springboard's *The Newsroom*. It allows the user to mix text and graphics on a single page divided into two columns of equal width. It has been a friendly publishing partner for clubs, user groups and schools who have used the 64 for years. Its greatest appeal was the hundreds of quality graphics its clip art disks included and its ability to transmit files between systems using telephone connections. However, when compared with the new generation of publishing programs, *The Newsroom* has become a friendly but very limited tool.

The new professional desktop publishing programs, including those for the 64 and 128, use a "What you see is what you get" (WYSIWYG) screen display. Your text type style will be displayed on the screen. The same is true of graphics, headlines, bylines, logos, captions, gutters, columns, subheads, lead and agate lines—they are all there ready for you to adjust, move, cut or duplicate. The better programs have kerning capability which adjusts the spacing between words and letters so they are proportionally aligned and more professional in appearance. Because everything on the screen is electronically displayed, you can adjust or move both text and graphics by simply pointing to them, lifting them off the screen page and repositioning or editing them. These features make correcting mistakes or revising layouts as simple and fast as snapping your fingers.

Commodore 64 Software

The newest entries into the desktop publishing arena for the 64 are *geoPublish*, *Outrageous Pages*, and *Timeworks Desktop Publisher*. [**Editor's Note:** Personal Newsletter *from Softsync arrived in our office too late to be included here. Look for a complete review in an upcoming issue.*]

GeoPublish is the eargerly-anticipated offering from Berkeley Softworks. It will work with any input device for which your system has drivers, but I've found the 1531 mouse far and away the easiest and fastest. The program electronically duplicates every task previously performed by hand. Before you begin your layout, you format a master page which contains designs and text which appear on every page of your document. The program lets you create and number up to 16 different pages. If you need to exceed that count (the program allows you to publish entire books if you wish), you'll have to do a little manual adjusting to keep the page count consecutive. Once your master page has been created, you can import text or graphics from other productivity programs both GEOS and non-GEOS compatible (using a graphic and text grabber utility).

Your documents can be spread across a page divided into one to four columns using icon-activated options and pull-down windows. Anyone familiar with GEOS will have no trouble mastering this powerful tool.

If you already own GEOS, adding *geoPublish* to your software library is a logical step. It is a powerful and easy-to-use product. I've been delighted with its options and the results it produces. The program's single weakness is cost. While the program itself retails for only $69.95 (a reasonable price considering the power the program packs), you must have a copy of GEOS to be able to use it. And to bring the program up to its full speed, you'll also want a copy of *Deskpack 1* (it has the graphics grabber you need to import non-GEOS graphics) and

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by Leo W. Brenneman

Air Miles
for the Commodore 64

Air Miles calculates the straight line distance between cities of the world. When you LOAD and RUN the program, you will be presented with the following menu:

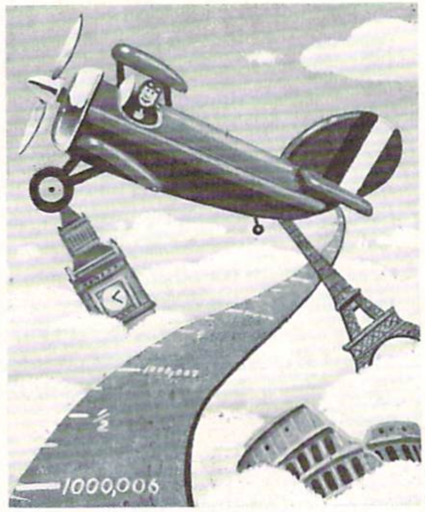
[1] View List of Cities
[2] Find Distance Between Cities
[3] Exit Program

If you choose Option 1, you can scroll through a list of 69 cities by pressing RETURN or return to the menu at any time by pressing the space bar.

Option 2 asks you to type in the names of any two cities on the list, and the program will then display the distance in statute miles between them. (If you want to know nautical miles, multiply the result by .8684.) Typing a name not on the list, or spelling it differently from the way it appears on the list, will bring up the message: "Not on List—Check Menu Item 1." The message will remain on the screen for several seconds then return to the menu, so you can check the list of cities for a correct name or spelling.

The location of any spot on earth can be identified by its latitude and longitude. Latitude is indicated on maps by dividing the northern and southern hemispheres into ninety degrees each, with zero being the equator and 90 being either of the poles. The lines of latitude are called parallels.

The earth is also divided into eastern and western hemispheres, each hemisphere is divided by meridians (lines of longitude) running north and south from pole to pole. The zero meridian runs through Greenwich, England, and subsequent meridians are numbered in each direction, east and west, to 180 degrees on the opposite side of the globe. The International Date Line runs, with a few deviations, along the 180th meridian.



ED SAUK

Latitude and longitude are usually stated in degrees and minutes. Knowing the coordinates of latitude, longitude and direction for any two locations permits the calculation of the distance between them.

You can customize the list of cities, either by adding to it or substituting different names and coordinates for the existing ones. If you wish to substitute one or more names, list the program and place the cursor over the first letter of the city name you wish to replace in the list of cities, which starts at line number 760. Type the new name and coordinates right over the old information, then RETURN. When you are finished be sure to save your new version.

Adding names to the list is only slightly more complicated. The program lines in the list of cities are numbered by 10, so there is plenty of room for new entires between each existing entry. Just type a new line number and the data statement for each new city. (The existing list is in alphabetical order, but does not need to be. This was done to make it easier to find a particular city.)

After you have typed in the information for all your *additional* names, multiply the number of new names by seven (the number of data items in each entry) and add this result to the number 483 in the DIM statement in line 740, and in the FOR-NEXT loop in line 750. You can add as many names as you like, but each name you add will slightly increase the time required to execute the program.

If you add the name of a city that can be confused with another city of the same name, such as "Kansas City," you can enter it in the list as "Kansas City MO" or "Kansas City KS." Also, if you do not like the way the name of any city is spelled on the existing list, you can change it. For example, a listed name is "St. Louis," which you can change to "St Louis" or "Saint Louis."

Where do you find the coordinates for your new entries? One source is a world atlas, most of which have an index listing the latitude and longitude of many cities and geographical landmarks. Another source is navigational charts. It is also fairly easy to estimate the coordinates from geographical (not road) maps. I called this program "Air Miles" and not "Airline Miles," because the coordinates given in atlases are for cities, not necessarily for airports. Some airports are located ten or more miles from the cities they serve.

NOTE: Some atlases only give degrees and omit the minutes. If you are using this kind of data, just enter zero for minutes. The resulting calculations will be somewhat less accurate. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Air Miles

```
140 CLR:POKE 53280,0:POKE 53281,2
    :POKE 646,0:PRINT CHR$(147)'GDFI
150 PRINT"[SPACE2,SHFT C36,SPACE2]
    "'BASD
160 PRINT"[DOWN2,SPACE2]
    ONE MOMENT PLEASE..READING CITY
    DATA"'BAAL
170 PRINT"[DOWN,SPACE2,SHFT C36,
    SPACE2]":GOSUB 740'CECH
180 PRINT CHR$(147)'CFBF
190 PRINT"[SPACE2,SHFT U,SHFT C34,
    SHFT I] "'BAKH
200 PRINT"[SPACE2,SHFT B,SPACE12]
    AIR MILES[SPACE13,SHFT B] "'BADE
210 PRINT"[SPACE2,SHFT B,SPACE34,
    SHFT B] "'BAPD
220 PRINT"[SPACE2,SHFT B] [1]
     VIEW LIST OF CITIES[SPACE10,
    SHFT B] "'BAOI
230 PRINT"[SPACE2,SHFT B,SPACE34,
    SHFT B] "'BAPF
240 PRINT"[SPACE2,SHFT B] [2]
     FIND DISTANCE BETWEEN CITIES
    [SHFT B] "'BAXL
250 PRINT"[SPACE2,SHFT B,SPACE34,
    SHFT B] "'BAPH
260 PRINT"[SPACE2,SHFT B] [3]
```

```
     EXIT PROGRAM[SPACE17,SHFT B]
     "'BAXL
270 PRINT"[SPACE2,SHFT B,SPACE34,
     SHFT B] "'BAPJ
280 PRINT"[SPACE2,SHFT B,SPACE10]
     SELECT 1 - 3[SPACE12,SHFT B]
     "'BAXL
290 PRINT"[SPACE2,SHFT J,SHFT C34,
     SHFT K] "'BABI
300 GOSUB 600'BDJX
310 GET MS$:IF MS$=""THEN 310'EKSC
320 MS=VAL(MS$):IF MS<1 OR MS>3 THEN
     310'HRCH
330 ON MS GOTO 1450,360,350'CONE
340 GOTO 310'BDDC
350 PRINT"[CLEAR]":END'CBFD
360 R=3963.34:GOSUB 600'CMCG
370 INPUT"[DOWN,SPACE2]
     NAME OF 1ST CITY";C1$:GOSUB 620
     :GOSUB 480:Y1=RA:D1=V'FVTQ
380 IF V$=""THEN 1610'DGMI
390 GOSUB 650:GOSUB 480:X1=RA:D2=V
     :GOSUB 600'FURN
400 INPUT"[DOWN,SPACE2]
     NAME OF 2ND CITY";C2$:GOSUB 680
     :GOSUB 480:Y2=RA:D3=V'FVJK
410 IF V$=""THEN 1610'DGMC
420 GOSUB 710:GOSUB 480:X2=RA
     :D4=V'EQYG
430 IF D1<>D3 THEN Y2=-Y2'GITG
440 IF D2<>D4 THEN X2=-X2'GITH
450 A=SIN(Y1):B=SIN(Y2)'ELKI
460 C=COS(Y1):D=COS(Y2)
     :E=COS(X2-X1)'HTKN
470 GOTO 500'BDEG
480 DD=M/60+D:RA=DD/57.2957795'FVGO
490 RETURN'BAQH
500 F=(A*B)+(C*D*E)'FKAE
510 FF=-ATN(F/SQR(-F*F+1))+([PI]/2)
     :D=R*FF:D%=D'OWBO
520 PRINT:PRINT"[UP4,SPACE5]
     THE DISTANCE BETWEEN[SPACE11]"
     :PRINT'DCPN
530 PRINT"[SPACE5]"C1$ " AND "C2$"
     [SPACE11]":PRINT"[SPACE13]"'CHHJ
540 PRINT"[SPACE5]IS.....";D%;
     " MILES.":PRINT'CFPJ
550 PRINT"[SPACE2,SHFT C36,SPACE2]
     "'BASH
560 PRINT"[DOWN,SPACE7]
     PRESS SPACE BAR FOR MENU"
     :GOSUB 600'CEAO
570 GET AN$:IF AN$=""THEN 570'EKRK
580 IF ASC(AN$)=32 THEN PRINT"[CLEAR]"
     :GOTO 190'GLGN
590 GOTO 570'BDLJ
600 GET KB$:IF KB$<>""THEN 600'FKEF
610 RETURN'BAQB
620 FOR J=1 TO QN STEP 7'EFIF
630 IF C1$=C$(J)THEN D$=C$(J+1)
     :GOSUB 2000:RETURN'HWWL
640 NEXT:V$="":RETURN'DEAG
650 FOR J=1 TO QN STEP 7'EFII
660 IF C1$=C$(J)THEN D$=C$(J+4)
     :GOSUB 2100:RETURN'HWBO
670 NEXT:RETURN'CBXI
680 FOR J=1 TO QN STEP 7'EFIL
690 IF C2$=C$(J)THEN D$=C$(J+1)
     :GOSUB 2200:RETURN'HWAR
700 NEXT:V$="":RETURN'DEAD
710 FOR J=1 TO QN STEP 7'EFIF
720 IF C2$=C$(J)THEN D$=C$(J+4)
     :GOSUB 2300:RETURN'HWEL
730 NEXT:RETURN'CBXF
740 DIM C$(483)'BHUG
750 FOR J=1 TO 483:READ A$:C$(J)=A$
     :NEXT:QN=J-1:RETURN'JXIQ
760 DATA ALBUQUERQUE,35,0,N,106,9,
     W'BBCN
770 DATA AMSTERDAM,53,23,N,4,54,E'BYMO
780 DATA ANTWERP,51,13,N,4,25,E'BWNO
790 DATA ATHENS,37,58,N,23,46,E'BWJP
800 DATA ATLANTA,33,50,N,84,24,W'BXJH
810 DATA BALTIMORE,39,18,N,76,37,
     W'BAWJ
820 DATA BELFAST,54,35,N,5,56,W'BWLJ
830 DATA BELGRADE,44,50,N,20,37,E'BYLK
840 DATA BERLIN,52,32,N,13,24,E'BWLL
850 DATA BOSTON,42,20,N,71,0,W'BVAM
860 DATA BUENOS AIRES,34,30,S,58,20,
     W'BCOP
870 DATA BUFFALO,42,55,N,78,50,W'BXKO
880 DATA CAIRO,30,1,N,31,14,E'BUHO
890 DATA CAPE TOWN,33,56,S,18,28,
     E'BYOR
900 DATA CARACAS,10,30,N,66,50,W'BXDI
910 DATA CHICAGO,41,45,N,87,40,W'BXPJ
920 DATA CINCINNATI,39,10,N,84,26,
     W'BBBL
930 DATA COLUMBUS,38,57,N,83,1,W'BXNM
940 DATA CLEVELAND,41,28,N,81,43,
     W'BARN
950 DATA DALLAS,32,47,N,96,48,W'BWON
960 DATA DENVER,39,43,N,105,1,W'BWQO
970 DATA DETROIT,42,20,N,83,3,W'BWBP
980 DATA DUBLIN,53,20,N,6,15,W'BVIQ
990 DATA ERIE,42,10,N,80,7,W'BTLQ
1000 DATA FAIRBANKS,64,59,N,147,40,
      W'BBCY
1010 DATA GENEVA,46,12,N,6,9,E'BUQY
1020 DATA GREENSBORO,36,7,N,79,46,
      W'BAJB
1030 DATA HARTFORD,41,47,N,72,41,
      W'BYOC
1040 DATA HONG KONG,22,11,N,114,14,
      E'BAHD
1050 DATA HONOLULU,21,19,N,157,52,
      W'BASE
1060 DATA HOUSTON,29,50,N,95,20,W'BXAF
1070 DATA INDIANAPOLIS,39,42,N,86,10,
      W'BDAH
1080 DATA ISTANBUL,41,0,N,29,0,E'BWAG
1090 DATA JERUSALEM,31,47,N,35,10,
      E'BASI
1100 DATA JOHANNESBURG,26,10,S,28,8,
      E'BCUB
1110 DATA KALAMAZOO,42,20,N,85,35,
      W'BAHB
1120 DATA KATMANDU,27,45,N,85,12,
```

```
      E'BYVC
1130 DATA LAS VEGAS,36,10,N,115,5,
      W'BYCD
1140 DATA LISBON,39,0,N,9,12,W'BUVD
1150 DATA LONDON,51,30,N,0,5,W'BUOE
1160 DATA LOS ANGELES,34,0,N,118,10,
      W'BBYG
1170 DATA MEXICO CITY,19,20,N,99,10,
      W'BBEH
1180 DATA MIAMI,25,52,N,80,15,W'BVGH
1190 DATA MINNEAPOLIS,44,58,N,93,20,
      W'BCSK
1200 DATA MONTREAL,45,30,N,73,34,
      W'BYVB
1210 DATA MOSCOW,55,45,N,37,35,E'BWEB
1220 DATA NEW ORLEANS,30,0,N,90,5,
      W'BYTD
1230 DATA NEW YORK,40,45,N,74,0,W'BWXD
1240 DATA OKLAHOMA CITY,35,25,N,97,30,
      W'BDLG
1250 DATA OMAHA,41,15,N,96,0,W'BUAF
1260 DATA PARIS,48,50,N,2,20,E'BUCG
1270 DATA PHILADELPHIA,40,0,N,75,10,
      W'BCUI
1280 DATA PITTSBURGH,40,25,N,79,55,
      W'BBYJ
1290 DATA PHOENIX,33,30,N,112,10,
      W'BYJK
1300 DATA PROVIDENCE,41,41,N,71,15,
      W'BBHC
1310 DATA QUEBEC,46,52,N,71,13,W'BWEC
1320 DATA RENO,39,30,N,119,0,W'BUDC
1330 DATA RICHMOND,37,3,N,77,27,W'BXWE
1340 DATA RIO DE JANEIRO,23,0,S,43,12,
      W'BCPH
1350 DATA ROME,41,54,N,12,30,E'BUDF
1360 DATA SAN FRANCISCO,37,35,N,122,
      30,W'BEPJ
1370 DATA SEATTLE,47,41,N,122,15,
      W'BYNJ
1380 DATA ST. LOUIS,38,40,N,90,20,
      W'BYRK
1390 DATA SPOKANE,47,45,N,117,25,
      W'BYVL
1400 DATA TAMPA,27,57,N,82,30,W'BVSC
1410 DATA TOKYO,35,45,N,139,45,E'BWND
1420 DATA TORONTO,43,39,N,79,20,W'BXKF
1430 DATA TUCSON,32,14,N,110,59,W'BXNF
1440 DATA WASHINGTON,38,52,N,77,0,
      W'BALH
1450 PRINT"[CLEAR,DOWN,SPACE7]PRESS
      [RVS]RETURN[SPACE3,RVOFF]
       TO SCROLL"'BAQL
1460 PRINT"[SPACE7]PRESS [RVS]
      SPACE BAR[RVOFF] FOR MENU"'BAFL
1465 PRINT:PRINT TAB(7)"[SHFT O,
      CMDR Y24,SHFT P]"'DDEE
1470 POKE 650,255:FOR X=1 TO QN STEP
      7'FNTK
1480 PRINT TAB(7)"[CMDR H]
      "TAB(13)C$(X)TAB(32)"[CMDR N]
      "'ENIL
1490 FOR T=1 TO 50:NEXT'EFYJ
1500 GET PN$:IF PN$=""THEN 1500'ELJD
1510 IF PN$=CHR$(13)THEN 1540'ELKD
1520 IF PN$=CHR$(32)THEN X=QN
      :GOTO 180'GOOH
1530 IF PN$<>CHR$(13)OR
      PN$<>CHR$(32)THEN 1500'JSLK
1540 NEXT'BAEC
1550 PRINT TAB(7)"[SHFT L,CMDR P24,
      SHFT @]"'CCNW
1560 PRINT"[DOWN,SPACE8]
      PRESS SPACE BAR FOR MENU"'BAOM
1570 GOSUB 600'BDJG
1580 GET PN$:IF PN$=""THEN 1580'ELRL
1590 IF PN$=CHR$(32)THEN POKE 650,0
      :GOTO 180'GQNO
1600 GOTO 1580'BELA
1610 PRINT"[DOWN2,SPACE2]
      NOT ON LIST. CHECK MENU ITEM
      1."'BALI
1620 FOR T=1 TO 1500:NEXT
      :PRINT"[CLEAR]":GOTO 190'GMLH
2000 M$=C$(J+2):V$=C$(J+3):D=VAL(D$)
      :M=VAL(M$):V=ASC(V$):J=QN
      :RETURN'MPKL
2100 M$=C$(J+5):V$=C$(J+6):D=VAL(D$)
      :M=VAL(M$):V=ASC(V$):J=QN
      :RETURN'MPQM
2200 M$=C$(J+2):V$=C$(J+3):D=VAL(D$)
      :M=VAL(M$):V=ASC(V$):J=QN
      :RETURN'MPKN
2300 M$=C$(J+5):V$=C$(J+6):D=VAL(D$)
      :M=VAL(M$):V=ASC(V$):J=QN
      :RETURN'MPQO
```

END

Tips & Tricks/Amiga

Continued from page 18

***Garrison* Play Tips:** Okay folks, *Garrison* (a *Gauntlet* look-alike) is out. (See review in March issue of *Commodore Magazine.*) For those of you who are arcade freaks, here are some tips to keep you alive just a bit longer:

- Always bring in all five characters! The initial power and stamina of each character is the same no matter how many characters you bring in, so give yourself as much manpower as possible.
- Don't try to take *every* treasure chest and bag. There is no reward for score in the game, so grabbing these things improves only your ego.
- Monsters that are only partially visible or just off the screen are still affected by the magic of a scroll. Use this to your advantage. In fact, the adjacent DEATHs on level four can be taken out with one scroll.
- Just because you are playing alone doesn't mean that you can't take advantage of the two-player mode. Have one character do all of the work and then, just before he hits the exit, pop in a new character and remove the old one. The new character can clean up on all the items in the area. This technique is very helpful to those of you who are trying to build up one character.
- Shooting the monsters is usually preferable to hand-to-hand combat. Don't worry about time; the rate at which a character's health deteriorates is much less damaging than a monster's hand-to-hand damage.

Graham Kinsey
Sharon, MA

by Gerhard Schilling

Historic Mazes

for the Commodore 64

Mystery and romance have surrounded the subject of mazes and labyrinths since ancient times. From prehistoric rock carvings to the few garden mazes surviving today, mankind has always been intrigued by them. For the mathematician, mazes are dealt with by network theory, a branch of topology. But for you and me, solving a maze, finding your way to the center and out again, can be a delightful pastime.

There are two main types of mazes. If the path from the outside to the center has no false turns, the maze is unicursal. If there are dead ends or a number of routes to the center, then it is multicursal and very easy to get lost.

Mathematical rules for getting out of a maze can be as complicated as the maze itself. But there is one simple rule: place either the left hand or the right hand on any wall and slide it along while you wander. You will eventually reach your goal. But as you would expect, mathematical mazes can be designed where following this rule strands you forever. So watch out.

Incidentally, the terms "maze" and "labyrinth" are interchangeable in modern English usage.

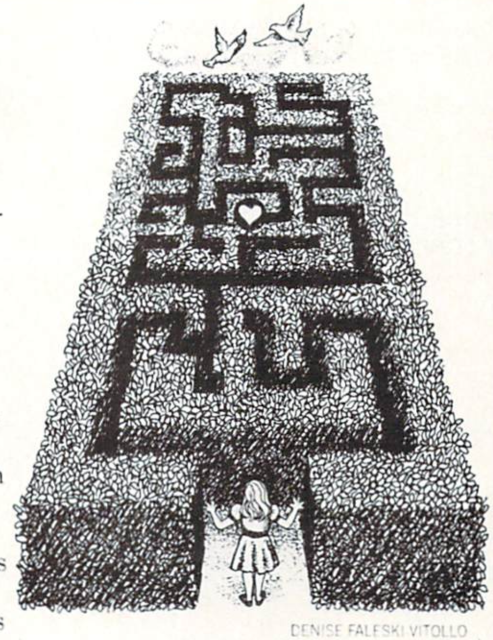
The Program

The program is written in BASIC, but runs very fast. After typing it in, save it on disk or tape. Then simply RUN and enjoy it.

All instructions appear on the screen. A menu will give you a choice of five different mazes to solve. You control your movements with the cursor keys. Except for the Labyrinth of Knossos, your objective is to reach the center of each maze and to touch the heart located there. Then try to find your way out again. Sights and sounds will tell you if you hit a wall during your movements.

Time elapsed is in minutes and seconds, and the number of wall hits are displayed continuously on the screen. You can quit at any time and look at the current results of your efforts in these terms. These results will be preserved while you attempt another maze.

None of the five mazes are difficult, if you have a bird's-eye view and can see the whole layout. Keep in mind that if you



DENISE FALESKI VITOLLO

were actually wandering inside a real maze, finding your way might not be so easy. Such a much more realistic situation is simulated as a special option for the Labyrinth of Knossos. More on this below.

Hampton Court, England

This famous maze was constructed in 1690 and is the oldest surviving hedge maze in England. It has a neat and symmetrical pattern, and its paths extend for half a mile. It is multicursal to sustain interest, but easy to solve. A copy of this garden maze was recreated near Williamsburg, Virginia and can be visited there.

Mathematical Maze

This is an example of an artificial paper design, where the hand rule, mentioned above, does not apply. The inner part is isolated from the other walls and different pathways can be followed successfully to the center. But it may not be easy to find the one which is shortest in terms of time elapsed.

Tuileries, France

This garden labyrinth, constructed of cypress or cherry trees, existed in the Tuileries Gardens of Paris in the seventeenth century. Its symmetrical design is almost but not quite unicursal. It may take a while to find the shortest pathway without retracing your steps.

Hatfield House, England

This hedge maze is located at the mansion of the present Marquis of Salisbury at Hertfordshire. It measures 108 by 174 feet and has two entrances, one at each end. From a terrace above it, one can get occasional glimpses of ensnared and perplexed visitors, wandering in the maze. Three different solutions lead to the center and several dead ends exist.

Knossos, Crete

This mythical labyrinth may have been constructed at Knossos, the palace of King Minos on the island of Crete, around 2000 B.C. Legend has it that it was designed by the renowned engineer Daedalus. He and his son Icarus were themselves imprisoned in the labyrinth, but escaped on wings made with wax. Icarus flew too high and the sun melted his wings. Exit Icarus.

Greek legend also tells us that the labyrinth housed the Minotaur, a cruel being half bull, half man. Every nine years, Athens had to pay a tribute of seven youths and seven maidens to the Court of Minos. One by one, these were thrust periodically into the labyrinth. After futile wanderings, they were eventually slain by the Minotaur. Exit youths and maidens.

Enter Theseus, son of the King of Athens, and Ariadne, fair-haired daughter of King Minos. With Ariadne providing a sword and a ball of thread, Theseus manages to slay the Minotaur, escape from the labyrinth and flee with fair Ariadne. Exit the Minotaur.

For subsequent dilly-dallying on the Island of Delos, and the tragic homecoming to Athens, remember Greek mythology. If you want a happy ending you might prefer the Strauss opera "Ariadne and Naxos."

The maze in the program is unicursal. You should have no difficulty getting out and reaching Ariadne who is waiting for you at the exit. Except there is the Minotaur, and, if you accept the optional challenge of realism, it will be pitch-dark!

At the beginning, the Minotaur has only a small chance of finding and killing you. If you seek to encounter him on purpose, the initial odds of who slays whom are even. But each time you hit a wall, your chance of getting out of the maze alive decreases rapidly. In the realistic version with complete darkness, you may be in real trouble. After all, Athenian youths were sacrificed for many years until Theseus, the most famous Athenian hero arrived and escaped from the Labyrinth of Knossos.

Good luck.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Historic Mazes

```
2 MA$="HISTORIC MAZES"'BDRF
4 GOSUB 442:GOTO 296'CHNE
6 POKE 214,22:PRINT'CHTG
8 PRINT WI$ SPC(3)"USE CURSORS TO
  MOVE"SS$ S$ S$"Q TO QUIT"'CMCR
10 PRINT HO$ BR$ W$ W% TAB(26) T$'CPYB
12 GOSUB 102:POKE V+31,0
   :POKE V+30,0'FPOF
14 PRINT HO$BR$TAB(10)W%WI$TAB(31)
   SS$SS$HO$TAB(31)FN TM(X)"
   :"FN TS(X)'GOUO
16 GET K$:IF K$="" THEN 16'EHEH
18 IF K$="Q" THEN 294'DFRI
20 IF PEEK(197)<>2 AND PEEK(197)<>7
   THEN 16'JOYG
22 IF K$=U$ THEN U%=U%-4'FJFF
24 IF K$=D$ THEN U%=U%+4'FJMH
26 IF K$=L$ THEN L%=L%-4
   :IF L%=<0 THEN POKE V+16,
   PEEK(V+16)AND 254:L%=255'PGRU
28 IF K$=R$ THEN L%=L%+4
   :IF L%=>256 THEN POKE V+16,
   PEEK(V+16)OR 1:L%=4'PEUW
30 POKE V,L%:POKE V+1,U%'DKYD
32 ON K GOTO 34,38,42,46,50'CPCF
34 IF L%>145 AND L%<156 AND U%>158
   AND U%<168 THEN 272'JXJN
36 GOTO 54'BCQF
38 IF L%>142 AND L%<148 AND U%>166
   AND U%<172 THEN 272'JXBR
40 GOTO 54'BCQA
42 IF L%>126 AND L%<132 AND U%>150
   AND U%<156 THEN 272'JXQM
44 GOTO 54'BCQE
46 IF L%>154 AND L%<164 AND U%>142
   AND U%<152 THEN 272'JXTQ
48 GOTO 54'BCQI
50 IF L%>138 AND L%<158 AND U%>86 AND
   U%<96 THEN 272'JVRL
52 GOTO 68'BCVD
54 IF PEEK(V+31)AND 1=1 THEN GOSUB 108
   :GOSUB 58'INWM
56 POKE V+31,0:POKE V+30,0
   :GOTO 14'FOPN
58 IF K$=U$ THEN U%=U%+4'FJEO
60 IF K$=D$ THEN U%=U%-4'FJNH
62 IF K$=L$ THEN L%=L%+4
   :IF L%=>256 THEN POKE V+16,
   PEEK(V+16)OR 1:L%=4'PEOU
64 IF K$=R$ THEN L%=L%-4
   :IF L%=<0 THEN POKE V+16,
   PEEK(V+16)AND 254:L%=255'PGXW
66 POKE V,L%:POKE V+1,U%:W%=W%+1
   :RETURN'GRJP
68 IF MK=1 THEN 54'DFWN
70 IF RR=1 THEN POKE 214,10:PRINT
   :POKE 211,28:PRINT SS$ SS$
   :RR=0'IDEO
72 Z%=1+W%+RND(1)*15:IF Z%<15 THEN
   80'IRLN
74 L=63+8*INT(RND(1)*16)'GLYN
76 R=8*INT(RND(1)*13):U=107+R
   :IF W%>19 THEN U=195
   :IF W%>30 THEN L=87'PHIB
78 POKE V+2,L:POKE V+3,U'EJWP
80 IF PEEK(V+30)<>255 THEN 54'GKRK
82 ZZ%=W%+RND(0)*10:POKE 198,0
   :IF ZZ%<10 THEN 96'IYTQ
84 PRINT CL$"THE MINOTAUR GOT YOU"
   :KI=1:GOSUB 108:GOSUB 108'EPAT
86 POKE V+21,0:POKE V+21,2'ELGO
88 POKE 214,22:PRINT:PRINT WI$
   RT$"FOR MENU AND/OR RESULTS"S$'DQFX
90 GET X$:IF X$="" THEN 90'EHGJ
92 IF ASC(X$)<>13 THEN GOSUB 102
   :GOTO 90'HMQN
94 GOTO 294'BDOK
96 GOSUB 102:MK=1:KI=0:POKE V+21,0
   :POKE V+21,1'HXPU
98 PRINT HO$ WI$"YOU KILLED THE
   MINOTAUR - CONTINUE!"SS$'BJIA
100 GOTO 280'BDJV
102 FOR T=0 TO 24:POKE M+T,0:NEXT
    :POKE M+24,15'IRFF
104 POKE M+1,110:POKE M+5,9:POKE M+6,9
    :POKE M+4,17:POKE M+4,16'KDVL
106 FOR T=1 TO 500:NEXT:POKE M+24,0
    :RETURN'HNEH
108 POKE V+32,9:POKE M+0,240
    :POKE M+1,33:POKE M+5,8
    :POKE M+22,104'KGSP
110 POKE M+23,1:POKE M+24,79
    :POKE M+4,129:FOR T=1 TO 70
    :NEXT'KAAH
112 POKE M+4,128:POKE M+24,0
    :POKE V+32,13:IF K=5 THEN POKE
    V+32,0'LCGK
114 RETURN'BAQA
116 POKE Z+J+LI*40,AA:RETURN'FKTH
118 FOR J=H1 TO H2:POKE Z+J+LI*40,AA
    :NEXT J:RETURN'JSDN
120 FOR LI=L1 TO L2:POKE Z+J+LI*40,AA
    :NEXT LI:RETURN'JUFH
122 READ C:IF C=0 THEN RETURN'FEHC
124 READ A$:A=VAL(A$)'DIWE
126 IF A$="H" THEN A=111'EGYH
128 IF A$="V" THEN A=101'EGLJ
130 IF A$="L" THEN A=76'EFUB
132 IF A$="S" THEN A=32'EFTD
134 POKE Z+C+LI*40,A:GOTO 122'FMQH
136 FOR I=3 TO I1:POKE ZZ+Z1+I,160
    :POKE ZZ+880+I,160:NEXT'KBAQ
138 FOR I=Z2 TO 840 STEP 40
    :POKE ZZ+3+I,160:POKE ZZ+I1+I,160
    :NEXT:RETURN'MEEU
140 FOR I=3 TO I1: POKE ZZ+Z1+I,160
    :POKE V+2048+Z1+I,11'KBUL
142 POKE ZZ+880+I,160:POKE V+2928+I,11
    :NEXT'HVUK
144 FOR I=Z2 TO 840 STEP 40
    :POKE ZZ+3+I,160:POKE V+2051+I,
    11'KCJP
146 POKE ZZ+I1+I,160:POKE V+2048+I1+I,
    11:NEXT:RETURN'JXLP
148 I1=32:I2=29:Z1=240:Z2=240
    :GOSUB 136'FAWP
150 FOR LI=6 TO 17:FOR J=1 TO 7'GJEF
```

```
152 POKE Z+J+LI*40,101:POKE
    Z+J+16+LI*40,101:NEXT:NEXT'LAQO
154 AA=111:H1=1:H2=22:FOR LI=5 TO 9
    :GOSUB 118'HXFN
156 H1=H1+1:H2=H2-1:NEXT'FMVL
158 H1=6:H2=18:FOR LI= 13 TO 17
    :GOSUB 118'GTDQ
160 H1=H1-1:H2=H2+1:NEXT'FMVG
162 AA=32:H1=9:H2=11:FOR LI=14 TO 15
    :GOSUB 118:NEXT'IAPN
164 FOR LI=6 TO 17:GOSUB 122:NEXT'FKIK
166 POKE V+2185+11*40,1:RETURN'FMRM
168 I1=34:I2=30:Z1=120:Z2=160
    :GOSUB 136'FAOR
170 AA=111:H1=1:H2=23:FOR LI=1 TO 4
    :GOSUB 118:NEXT LI'IBDM
172 H1=2:H2=23:FOR LI=14 TO 17
    :GOSUB 118:NEXT LI'HWBN
174 AA=101:L1=2:L2=17:J=1:GOSUB 120
    :J=24:GOSUB 120'HEIQ
176 L1=5:L2=13:FOR J=2 TO 23:GOSUB 120
    :NEXT J'HTGQ
178 AA=111:LI=9:H1=3:H2=16
    :GOSUB 118'FWUS
180 LI=5:FOR J=10 TO 13:GOSUB 116
    :NEXT J'GPBK
182 FOR B=1 TO 146:READ B$:NEXT'FJYJ
184 FOR LI=2 TO 17:GOSUB 122:NEXT'FKEM
186 POKE V+2184+12*40,1:RETURN'FMRO
188 I1=26:I2=26:Z1=120:Z2=160
    :GOSUB 136'FAUT
190 AA=101:H1=1:H2=17:FOR LI=2 TO 17
    :GOSUB 118:NEXT'IAJO
192 AA=111:H1=1:H2=16:FOR LI=1 TO 8
    :GOSUB 118'HXDP
194 H1=H1+1:H2=H2-1:NEXT'FMVN
196 H1=8:H2=9:FOR LI=10 TO 17
    :GOSUB 118'GSJR
198 H1=H1-1:H2=H2+1:NEXT'FMVR
200 J=1:FOR LI=17 TO 11 STEP-1'GKIC
202 POKE Z+J+LI*40,76:J=J+1:NEXT'HOCF
204 J=9:FOR LI=9 TO 2 STEP-1'GICF
206 POKE Z+J+LI*40,32:J=J+1:NEXT'HOTJ
208 FOR B=1 TO 480:READ B$:NEXT'FJAI
210 FOR LI=4 TO 17:GOSUB 122:NEXT'FKGC
212 POKE V+2182+10*40,1:RETURN'FMNE
214 I1=34:I2=30:Z1=120:Z2=160
    :GOSUB 136'FAOJ
216 AA=101:H1=1:H2=24:FOR LI=2 TO 17
    :GOSUB 118:NEXT LI'ICAO
218 AA=111:LI=1:FOR J=1 TO 23
    :GOSUB 116:NEXT'HTHN
220 LI=2:FOR J=4 TO 22:GOSUB 116
    :NEXT'GNJE
222 LI=3:FOR J=8 TO 21:GOSUB 116
    :NEXT'GNNG
224 LI=4:FOR J=10 TO 20:GOSUB 116
    :NEXT'GOEI
226 LI=12:FOR J=7 TO 18:GOSUB 116
    :NEXT'GOQK
228 LI=13:FOR J=7 TO 18:GOSUB 116
    :NEXT'GORM
230 LI=14:FOR J=6 TO 19:GOSUB 116
    :NEXT'GOSF
232 LI=15:FOR J=5 TO 20:GOSUB 116
    :NEXT'GOKH
234 LI=16:FOR J=6 TO 22:GOSUB 116
    :NEXT'GOOJ
236 LI=17:FOR J=4 TO 23:GOSUB 116
    :NEXT'GOOL
238 LI=5:FOR J=14 TO 18:GOSUB 116
    :NEXT'GOQN
240 AA=32:H1=11:H2=14:FOR LI=8 TO 10
    :GOSUB 118:NEXT LI'ICCL
242 FOR B=1 TO 574:READ B$:NEXT'FJEG
244 FOR LI=2 TO 17:GOSUB 122:NEXT'FKEJ
246 POKE V+2186+9*40,1:RETURN'FLCL
248 AA=101:H1=0:H2=17:FOR LI=3 TO 17
    :GOSUB 118:NEXT'IAJS
250 AA=111:H1=0:H2=16:FOR LI=2 TO 8
    :GOSUB 118'HXDK
252 H1=H1+1:H2=H2-1:NEXT'FMVI
254 H1=7:H2=9:FOR LI=10 TO 17
    :GOSUB 118'GSIM
256 H1=H1-1:H2=H2+1:NEXT'FMVM
258 AA=101:J=9:FOR LI=3 TO 10
    :GOSUB 116:NEXT'HTMR
260 AA=32:LI=2:FOR J=9 TO 17:GOSUB 116
    :NEXT'HSXK
262 PRINT HO$ U$ "WAIT 5" TAB(30) SS$
    SS$'COFK
264 J=0:FOR LI=17 TO 10 STEP-1'GKGM
266 POKE Z+J+LI*40,76:J=J+1:NEXT'HOCP
268 FOR B=1 TO 766:READ B$:NEXT
    :IF B$<>"0" THEN PRINT"DATA ERROR"
    :STOP'LNCW
270 FOR LI=3 TO 10:GOSUB 122:NEXT
    :RETURN'GLXI
272 GOSUB 102:POKE V+32,10:S(K)=1'EQNK
274 PRINT HO$"SUCCESS"SS$:POKE 198,0
    :IF K=5 THEN 88'FRBQ
276 L%=L%+4:U%=U%-4:IF K=1 OR K=4
    THEN L%=L%+8:U%=U%+12'NDPY
278 POKE V,L%:POKE V+1,U%
    :POKE V+31,0'FQTR
280 GOSUB 102:POKE 214,22:PRINT'DLJH
282 PRINT SPC(3) RT$"AND FIND YOUR
    WAY OUT"'CFIO
284 GET X$:IF X$="" THEN 284'EIJM
286 IF ASC(X$)<>13 THEN GOSUB 102
    :GOTO 284'HNOR
288 PRINT HO$;:FOR X=1 TO 38:PRINT S$;
    :NEXT:PRINT'HPRT
290 IF K<>5 THEN POKE V+32,13'GILK
292 GOTO 6'BBPH
294 W(K)=W%:MM(K)=FN TM(X)
    :MS(K)=FN TS(X):W%=0'GHFU
296 RESTORE:POKE V+32,14
    :POKE V+33,6'FNKQ
298 PRINT CL$ BL$ SPC(12) MA$'CMAQ
300 PRINT D$ SPC(4)"MENU" D$'CGOA
302 POKE V+21,0:IF PEEK(V+16)<>0 THEN
    POKE V+16,PEEK(V+16)AND 254'NYOM
304 PRINT"1"S$ M$(1)", ENGLAND"'BHEF
306 PRINT"2"S$ M$(2)'BHEF
308 PRINT"3"S$ M$(3)", FRANCE"'BHIJ
310 PRINT"4"S$ M$(4)", ENGLAND"'BHKC
312 PRINT"5"S$ M$(5)", CRETE"'BHCE
314 PRINT D$ WI$"6 RESULTS"'BFJG
```

```
316 PRINT D$ BL$"7 END"'BFDG
318 PRINT SPC(10)"SELECT A NUMBER"
    :GOSUB 102'DHHN
320 GET KK$:IF KK$="" THEN 320'EKYD
322 K=VAL(KK$):IF K=0 OR K>7 THEN
    GOSUB 102:GOTO 320'JSRK
324 IF K=5 THEN 372'DFAG
326 IF K=6 THEN 352'DFEH
328 IF K=7 THEN PRINT CL$"END"
    :END'FGTM
330 POKE V+33,5:POKE V+32,13
    :PRINT CO$'FQWG
332 ON K GOSUB 336,340,344,348
    :GOSUB 414'DUKH
334 S(K)=0:TI$="000000":GOTO 6'DLGJ
336 PRINT SPC(13) M$(1)'CIPI
338 L%=167:U%=219:GOSUB 148
    :RETURN'EQNN
340 PRINT SPC(11) M$(2)'CIOD
342 L%=55:U%=147:GOSUB 168:RETURN'EPNI
344 PRINT SPC(10) M$(3)'CIOH
346 L%=203:U%=147:GOSUB 188
    :RETURN'EQIM
348 PRINT SPC(13) M$(4)'CISL
350 L%=255:U%=155:GOSUB 214
    :RETURN'EQEH
352 POKE V+32,13:PRINT CL$ SPC(15)
    WI$"RESULTS"D$'ESVM
354 PRINT TAB(21) T$ TAB(29) BA$ W$
    :PRINT WI$ TAB(20)"MIN SEC"D$'FWUP
356 FOR J=1 TO 5:PRINT BL$ M$(J);'ENHN
358 IF S(J)=1 THEN PRINT WI$
    CHR$(115) BL$;'FRBQ
360 IF MS(J)<>0 THEN PRINT TAB(20)
    WI$ MM(J) MS(J) TAB(33) BA$ W(J);
    'HICP
362 PRINT:NEXT:IF KI=0 THEN 366'FINJ
364 PRINT BA$ U$"MINOTAUR GOT YOU"D$
    D$'BJTO
366 PRINT TAB(5) BL$ D$ RT$"FOR MENU"
    :GOSUB 102'DOBQ
368 GET KK$:IF KK$="" THEN 368'EKLP
370 GOTO 296'BDQF
372 PRINT CL$:KI=0:MK=0
    :PRINT SPC(10) M$(5)'FUTN
374 PRINT D$"YOU HAVE TWO CHOICES
    :"D$'BEUP
376 PRINT WI$"E"BL$ S$"EASY-BIRD'S
    EYE VIEW"D$'BKHS
378 PRINT BA$"R"BL$ S$"REALISTIC-MAZE
    IS DARK"D$'BKWV
380 PRINT SPC(5)"SELECT"S$ WI$"E"S$
    BL$"OR"S$ BA$"R":GOSUB 102'DVWO
382 GET Y$:IF Y$="" THEN 382'EIKL
384 IF Y$<>"E" AND Y$<>"R" THEN
    382'HHQP
386 POKE V+32,0:POKE V+33,0'ELJP
388 IF Y$="E" THEN PRINT GR$'EFCQ
390 IF Y$="R" THEN PRINT BA$'EFSJ
392 PRINT CL$ WI$:IF Y$="R" THEN
    PRINT TAB(32) U$"WAIT 10"'GOCQ
394 I1=26:I2=26:Z1=120:Z2=160'EVXR
396 IF Y$="E" THEN GOSUB 136'EFFP
398 IF Y$="R" THEN GOSUB 140'EFNR
400 PRINT SPC(3)"KNOSSOS-CRETE
    [FRAGMENT]"'CCXG
402 GOSUB 248:L=191:U=139:L%=119
    :U%=155'FAMI
404 GOSUB 414:GOSUB 428:POKE V+40,2
    :POKE V+21,255'GVAK
406 POKE 214,4:PRINT:POKE 211,16'DNNI
408 PRINT WI$ CHR$(115)
    S$"ARIADNE"'CKAL
410 POKE 214,10:PRINT:POKE 211,28'DOLD
412 PRINT BR$"[BACK ARROW] MINOTAUR"
    :RR=1:GOTO 334'DLBI
414 POKE 2040,13:POKE S,0:POKE S+1,15
    :POKE S+2,0'GWOL
416 POKE S+3,0:POKE S+4,15
    :POKE S+5,0'GPWM
418 POKE S+6,0:POKE S+7,15
    :POKE S+8,0'GPFO
420 POKE S+9,0:POKE S+10,15
    :POKE S+11,0'GRRH
422 FOR I=S+12 TO S+62:POKE I,0
    :NEXT'HMXJ
424 POKE V+21,1:POKE V+39,1'ELPI
426 POKE V,L%:POKE V+1,U%:RETURN'ELYK
428 POKE 2041,14:POKE S%,0
    :POKE S%+1,31:POKE S%+2,0'GAAQ
430 POKE S%+3,0:POKE S%+4,31
    :POKE S%+5,0'GSFI
432 POKE S%+6,0:POKE S%+7,31
    :POKE S%+8,0'GSOK
434 POKE S%+9,0:POKE S%+10,31
    :POKE S%+11,0'GUBM
436 POKE S%+12,0:POKE S%+13,31
    :POKE S%+14,0'GVTP
438 FOR I=S%+15 TO S%+62:POKE I,0
    :NEXT'HOYQ
440 POKE V+2,L:POKE V+3,U:RETURN'FKQH
442 DEF FN TM(X)=INT(TI/3600)'FNEK
444 DEF FN TS(X)=INT(TI/60)-60*FN
    TM(X)'ISIP
446 L%=0:U%=0:K=0:W%=0:K$=""'FRQP
448 V=53248:M=54272:S=832:S%=896
    :Z=1150:ZZ=1024'GMPW
450 D$=CHR$(17):U$=CHR$(145)
    :L$=CHR$(157):R$=CHR$(29)
    :S$=CHR$(32)'KLJR
452 CL$=CHR$(147):BL$=CHR$(154)
    :WI$=CHR$(5):BR$=CHR$(149)'IIQR
454 BA$=CHR$(144):GR$=CHR$(151)
    :HO$=CHR$(19)'GANQ
456 M$(1)="HAMPTON COURT"'BFQO
458 M$(2)="MATHEMATICAL MAZE"'BFIR
460 M$(3)="TUILERIES"'BFBI
462 M$(4)="HATFIELD HOUSE"'BFDL
464 M$(5)="KNOSSOS":W$="WALL HITS
    :"'CISQ
466 CO$=BR$+CL$:T$=WI$+"TIME:"'EPNR
468 RT$="PRESS"+S$+CHR$(18)
    +"<RETURN>"+CHR$(146)+S$'IQCY
470 FOR I=1 TO 5:SS$=SS$+S$:NEXT
    :RETURN'HOUM
472 DATA 7,S,8,V,12,V,15,S,16,V,22,S,
    0'BERN
474 DATA 8,V,9,V,14,S,15,V,16,L,21,S,
    0'BENP
```

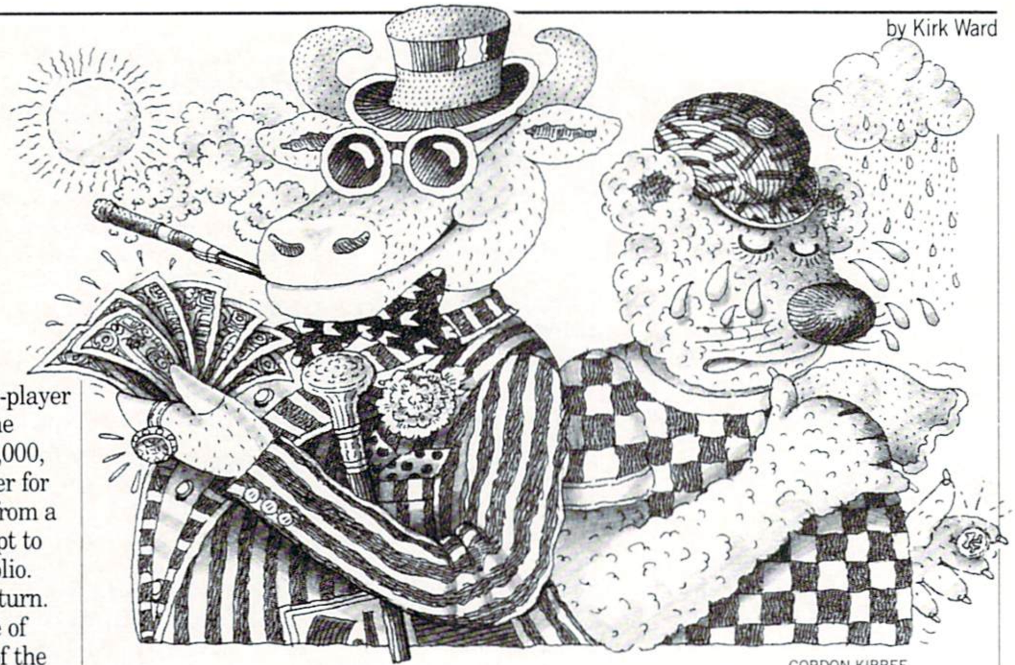
```
476 DATA 9,L,11,S,12,V,15,L,17,S,20,S,
    Ø'BFPR
478 DATA 5,S,6,V,12,L,16,S,17,V,18,V,
    Ø'BENT
480 DATA 2,L,3,S,16,V,21,H,Ø'BTBK
482 DATA 1,L,2,S,11,83,16,V,22,H,Ø,2,
    H,16,V,22,S,Ø'BQTQ
484 DATA 3,S,6,V,7,L,12,S,16,V,17,V,
    18,V,Ø'BIJR
486 DATA 5,V,6,L,7,S,8,V,12,V,13,V,17,
    V,18,V,19,L,20,H,Ø'BWBW
488 DATA 3,L,5,L,7,V,8,V,12,V,13,L,19,
    L,21,H,Ø'BMMW
490 DATA 2,L,8,L,12,L,22,H,Ø,1,L,12,S,
    Ø'BFYN
492 DATA 6,S,17,S,21,L,22,S,23,V,
    Ø'BAHO
494 DATA 2,V,7,V,16,S,17,L,21,S,22,V,
    Ø'BEGR
496 DATA 2,V,3,V,8,V,15,S,16,L,20,S,
    21,V,22,L,23,S,Ø'BSVW
498 DATA 5,S,7,S,14,S,17,S,19,H,20,H,
    23,S,Ø'BJEW
500 DATA 1,S,11,H,12,S,14,H,19,L,20,S,
    21,H,22,H,Ø'BPWH
502 DATA 2,H,5,L,7,L,10,H,11,S,13,L,
    14,S,18,L,19,S,20,L,21,S,Ø'BDXM
504 DATA 3,H,6,H,7,H,8,H,9,L,10,S,14,
    H,15,L,16,H,17,L,18,S,20,S,23,H,
    Ø'BLJQ
506 DATA 5,L,9,S,10,L,12,V,13,L,17,S,
    22,L,23,S,Ø'BOJN
508 DATA 4,S,6,S,8,S,9,L,10,H,11,S,12,
    L,13,H,14,H,15,H,16,S,22,H,Ø'BHIT
510 DATA 2,S,4,L,5,H,8,L,9,S,11,S,13,
    S,15,S,18,L,19,H,Ø'BVOK
512 DATA 3,L,4,S,6,H,7,L,8,S,10,211,
    11,H'BGOI
513 DATA 12,L,13,L,14,L,16,L,17,H,18,
    H,19,H'BJXK
514 DATA 20,S,Ø,3,S,5,L,6,H,7,H,8,H,
    10,S'BGIL
515 DATA 12,S,14,S,15,L,16,S,18,H,19,
    H,20,H,Ø'BLCN
516 DATA 2,V,3,L,5,V,8,S,10,L,12,L,14,
    V,15,V,17,V,18,V,21,S,22,V,23,V,
    Ø'BMTT
518 DATA 2,L,6,H,7,S,8,V,13,S,14,V,15,
    L,16,S,17,V,18,V,19,L,20,S,21,V,
    22,V'BPPW
520 DATA 23,V,Ø,7,L,10,L,12,S,13,V,14,
    L,17,V,18,V,19,L,20,S,21,L,23,V,
    Ø'BMPO
522 DATA 1,L,13,L,18,L,Ø,8,S,9,V,Ø,9,
    L,Ø,Ø,8,S,9,V,Ø'BSAM
524 DATA 9,L,11,L,12,H,15,L,16,H,
    Ø'BATK
526 DATA 2,L,3,H,5,L,6,H,10,L,11,H,12,
    H,13,H,14,L,15,H,16,H,17,S,Ø'BHPT
528 DATA 3,S,6,S,8,211,10,H,11,H,12,S,
    14,H,15,H,16,S,Ø'BUUS
530 DATA 11,S,15,S,Ø,4,S,Ø,8,S,9,V,Ø,
    9,L,Ø,Ø,8,S,9,V,Ø,9,L,Ø'BBMN
532 DATA 16,S,17,L,23,S,Ø,5,S,15,S,16,
    L,22,S,Ø'BMVM
534 DATA 8,S,10,H,11,H,12,S,13,H,14,S,
    15,L,21,S,Ø'BPKO
536 DATA 9,L,10,H,11,H,19,S,20,S,
    Ø'BAFN
538 DATA 3,H,4,H,8,L,9,H,10,H,11,S,14,
    H,15,H,16,S,17,S,Ø'BWBU
540 DATA 4,S,10,H,11,H,13,L,14,H,15,S,
    Ø'BFDJ
542 DATA 2,L,3,H,Ø,1,L,2,H,3,S,12,83,
    23,H,Ø'BJDM
544 DATA 1,S,2,H,19,H,22,L,23,H,24,S,
    Ø'BELN
546 DATA 2,S,8,L,9,H,10,L,11,H,12,S,
    13,H,14,H,20,H,23,S,Ø'BXQT
548 DATA 12,V,13,V,14,S,17,L,21,H,
    Ø'BBTQ
550 DATA 6,L,9,S,12,V,13,V,14,L,21,V,
    Ø'BEXK
552 DATA 5,L,13,V,14,L,Ø,2,L,9,S,13,V,
    14,V,15,S,Ø'BPRO
554 DATA 2,H,3,S,4,L,5,L,14,V,15,L,22,
    L,Ø,1,L,2,H,3,L,Ø'BVTS
556 DATA 8,S,16,H,17,S,Ø,7,S,8,V,10,V,
    15,H,16,S,Ø'BPAS
558 DATA 8,V,10,L,14,H,15,S,Ø,9,L,13,
    H,14,S,Ø'BLBU
560 DATA 8,S,12,H,13,S,Ø,7,S,8,V,10,V,
    11,H,12,S,Ø'BPJN
562 DATA 7,H,8,V,10,L,11,S,Ø,10,S,
    Ø'BBIM
```

END

by Kirk Ward

Bulls and Bears

for the Commodore 64



GORDON KIBBEE

Bulls and Bears is a one- or two-player stock market simulation for the Commodore 64. You start with $10,000, and at the beginning of each quarter for the next ten years you can choose from a variety of investments in an attempt to maximize the return on your portfolio.

Two screens appear during each turn. The first displays the current value of your portfolio including the value of the stocks you own, your cash balance, any dividends you received that turn, your margin balance, and any interest the broker charges. The second screen shows the stocks that can be traded, the dividend each stock pays, their current prices, the amount the price has changed that quarter, and the number of shares you own. This screen also displays the current value of four market indexes, the amount of cash you have, total commissions you have paid that turn, and your market balance.

All trading is done while the second screen is displayed. To buy a stock press B, to sell press S, and to end your turn press E. When buying or selling a stock you will be asked to input the three-letter symbol for the stock (just pressing RETURN will cancel the transaction) and the number of shares you wish to trade. When buying a stock you will be asked if you want to buy on margin, and after selling a stock you will be asked if you want to pay margin.

Before making your investment decisions, study the four market indexes. These indexes are interrelated and affect the performance of individual investments. An increase in the energy index will cause a rise in the inflation index. Rising inflation will stimulate economic growth and cause interest rates to rise, but high inflation will have a negative impact on the economy. Low interest rates will aid economic growth, and high rates will put downward pressure on inflation.

There are ten major stocks traded during the game:

BNK: a banking stock that performs best when interest rates are lower.

RIT: a real estate investment trust stock that does best in periods of low interest rates but is more volatile than BNK.

UTL: a utility stock that is aided by lower interest rates and low energy prices.

CON: a consumer products company whose shares rise during periods of economic growth.

DEF: the stock of a defense contractor that has an unpredictable performance.

MFG: a manufacturing stock that does well as the economic index increases.

GMC: an auto company stock that performs best in a growing economy but can be very volatile.

TWA: an airline stock which is helped by low energy prices.

EXO: an oil company stock that does well during periods of increasing energy prices.

MIN: an extremely volatile mining stock that fluctuates with the inflation rate.

In addition there are two income investments:

BND: a corporate bond whose price changes inversely to interest rates.

MKT: a money market fund whose share price does not change but whose dividend fluctuates with interest rates. Investments pay their dividends to shareholders at the end of each year except MKT which pays one-fourth of its dividend each quarter.

If the price of a stock drops to zero the company is bankrupt and you will lose any shares you own. The company will restructure and its stock will begin trading again the next quarter. If the price of a stock climbs to $200 the stock will split. The number of shares you own will be doubled, and the share price will be halved.

In the first quarter of the first eight years a new issue will be offered. These stocks pay no dividends and are extremely volatile. If the price of one of these stocks drops to zero then the company is bankrupt, and the stock is removed from the game.

When you buy a stock you can borrow money from your broker either by allowing your cash balance to go below zero (but usually not lower than -$1000) or by buying on margin. When you buy on margin you pay only half the cost of the stock, and the broker lends you the other half.

When you sell a stock you will be given a chance to pay part or all of your margin balance. The broker charges two percent interest per quarter on margin balances and negative cash balances. In addition, the broker charges a commission of ten dollars plus ten cents per share on each transaction.

If your margin balance exceeds half the value of your portfolio, you will be faced with a margin call. You will have to pay off a certain amount of your margin balance before you will be allowed to trade. When the value of your portfolio drops below zero then you are bankrupt and the game ends.

Remember to watch the indexes. What goes up will most likely come down and vice versa. Be careful when buying stocks on margin. A sharp decline in the value of a margined stock could force you into bankruptcy. Only the bravest (or most foolhardy) investor should buy the new issues on margin. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Bulls and Bears

```
0 PRINT"[CLEAR]":X=RND(-TI)
  :POKE 53280,13:POKE 53281,1'GXNH
5 PRINT"[DOWN6]"SPC(12)"[RVS,GREEN]
  BULLS AND BEARS[RVOFF]"
  :PRINT"[DOWN3]"'DEJL
10 DIM N$(20),D(20),P(20),C(20),
   P1(20),P2(20),SP(12),B(20),I$(9),
   S(20)'BNQJ
15 C=7:GOSUB 980:INPUT"[BLACK]
   NUMBER OF PLAYERS (1/2)";NP'DKUM
20 IF NP>2 OR NP<1 THEN PRINT"[UP2]"
   :GOTO 15'HJCF
25 PRINT:C=9:GOSUB 980:INPUT"[BLACK]
   PLAYER 1 INITIALS";P1$'EMQN
30 IF LEN(P1$)<>3 THEN PRINT"[UP3]"
   :GOTO 25'HJAG
35 IF NP=1 THEN 50'DFYH
40 PRINT:GOSUB 980:INPUT"PLAYER 2
   INITIALS";P2$'DJAI
45 IF LEN(P2$)<>3 THEN PRINT"[UP3]"
   :GOTO 40'HJXM
50 YR=1:I3=6:M(1)=10000:M(2)=10000
   :PL=1'FGLL
55 FOR X=1 TO 12:READ N$(X),D(X)
   :P(X)=100:NEXT'GYIO
60 P(11)=120:FOR X=1 TO 8:READ I$(X)
   :NEXT:FOR X=13 TO 20
   :READ N$(X),P(X):NEXT'LMCQ
65 PRINT"[CLEAR]":S1=0:S2=0
   :FOR X=1 TO 20:S1=S1+P1(X)*P(X)
   :S2=S2+P2(X)*P(X):NEXT'NRDB
70 N1=INT(M1*.02):N2=INT(M2*.02)'GTEL
75 IF M(1)<0 THEN N1=N1-INT(M(1)*.02)
   'HSEQ
80 IF M(2)<0 THEN N2=N2-INT(M(2)*.02)
   'HSIM
85 M(1)=M(1)-N1+D1:M(2)=M(2)-N2+D2
   :T1=S1+M(1)-M1:T2=M(2)+S2-M2'MWLC
90 PRINT"[BLUE,SPACE2]YEAR
   :"YR"[SPACE3]QUARTER:"Q
   :GOSUB 1025'CIJM
95 PRINT TAB(18)P1$:PRINT TAB(18)"
   [SHFT *3]"'EKOQ
100 PRINT"STOCKS"SPC(15-LEN(STR$(S1)))
    "[GREEN]"S1'FLOC
105 IF M(1)<0 THEN PRINT"[BLACK]
    CASH"SPC(17-LEN(STR$(M(1))))"[RED]
    "M(1):GOTO 115'JYEM
110 PRINT"[BLACK]CASH"SPC(17-LEN(STR$
    (M(1))))"[GREEN]"M(1)'FPUE
115 PRINT"[BLACK]DIVIDENDS"SPC(12-LEN
    (STR$(D1)))"[GREEN]"D1'FLSJ
120 PRINT"[BLACK]MARGINS"SPC(14-LEN
    (STR$(M1)))"[RED]"M1'FLWF
125 PRINT"[BLACK]INTEREST"SPC(13-LEN
    (STR$(N1)))"[RED]"N1'FLRK
130 PRINT SPC(15)"[BLACK,SHFT *6]"
    :PRINT"TOTAL"SPC(16-LEN(STR$(T1)))
    T1'HPJM
135 IF NP=1 THEN 175'DGEG
140 PRINT"[HOME,DOWN3]"SPC(30)"[BLACK]
    "P2$:PRINT SPC(30)"[SHFT *3]"'EKSG
145 PRINT SPC(33-LEN(STR$(S2)))"
    [GREEN]"S2'FLBJ
150 IF M(2)<0 THEN PRINT
    SPC(33-LEN(STR$(M(2))))"[RED]"M(2)
    :GOTO 160'JYGK
155 PRINT SPC(33-LEN(STR$(M(2))))"
    [GREEN]"M(2)'FPUL
160 PRINT SPC(33-LEN(STR$(D2)))"
    [GREEN]"D2'FLVG
165 PRINT SPC(33-LEN(STR$(M2)))"[RED]
    "M2:PRINT SPC(33-LEN(STR$(N2)))
    N2'KXBR
170 PRINT SPC(27)"[BLACK,SHFT *6]"
    :PRINT SPC(33-LEN(STR$(T2)))
    T2'HPHO
175 PRINT:PRINT:PRINT"[SPACE2,RVS]
    SPACE TO CONTINUE[RVOFF]"
    :POKE 198,0'EIGQ
180 GET A$:IF A$=""THEN 180'EIIH
185 IF A$<>CHR$(32)THEN 180'FJRN
190 IF BR(1)=1 OR BR(2)=1 THEN
    1105'FQFK
195 IF YR=10 AND Q=4 THEN 1105'FKGO
200 PRINT"[CLEAR]":GOSUB 1090'CFOX
205 IF EN>9 THEN Y=Y-1'FGNF
210 IF EN<-5 THEN Y=Y+1'GGAC
215 EN=EN+Y:C1=Y:GOSUB 1090'EOLI
220 IF I1>9 THEN Y=Y-1'FGNC
225 IF I1<-5 THEN Y=Y+1'GGAI
230 I1=I1+C1+Y:C2=C1+Y:GOSUB 1090'GSWH
235 IF Y=-2 THEN Y=0'FEJI
240 I2=I2+C2+Y:C3=C2+Y:GOSUB 1090
    :I3=I3+Y:C4=Y'JDPM
245 IF I2<-6 THEN I2=I2+1:C3=C3+1'IOSN
250 IF I1-I3>2 THEN I3=I3+1
    :C4=C4+1'IQOJ
255 IF I1-I3<-2 THEN I3=I3-1
    :C4=C4-1'JQIP
260 IF I3<2 THEN I3=2:C4=0'FKIH
265 IF I3<5 THEN I1=I1+1:C2=C2+1'HOYO
270 IF I3>12 THEN I1=I1-1:C2=C2-1'HPUK
275 D(12)=I3-2'CIDL
280 IF D(12)<4 THEN D(12)=4'EMNI
285 IF D(12)>9 THEN D(12)=9'EMVN
290 GOSUB 1100:C(1)=(C3-C4)*Y
    :C(11)=-(10*C4)'HDEP
295 IF P(11)>160 THEN C(11)=0'EOJP
300 IF P(11)<70 THEN C(11)=C(11)
    +5'FSDD
305 GOSUB 1100:C(4)=(C2+C3)*Y
    :GOSUB 1100:C(5)=(C2+C3)*Y-2'JJSO
310 GOSUB 1100:C(9)=C1*Y*2:GOSUB 1100
    :C(7)=(C3-C4-C1)*Y'JHVK
315 GOSUB 1100:C(6)=C3*Y:GOSUB 1100
    :C(3)=-(C1+C4)*Y*2'JFWP
320 GOSUB 1100:C(10)=(C2+C4)*Y*2
    :GOSUB 1100:C(2)=-(C2+C4)*Y*2'LLTN
325 GOSUB 1100:C(8)=-C1*Y:C(9)=C(9)+C1
    :C(10)=C(10)+(5*C2)
    :GOSUB 1100'KTBT
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330 IF I2>5 THEN C(4)=C(4)+Y
    :C(7)=C(7)+Y:C(6)=C(6)+Y'JHXM
335 IF I2<0 THEN C(4)=C(4)-Y
    :C(7)=C(7)-(Y*2):C(6)=C(6)-(Y*2)
    'LNLU
340 GOSUB 1100'BEDC
345 IF I3>10 THEN C(1)=C(1)-(2*Y)
    :C(2)=C(2)-(3*Y):C(3)=C(3)-Y'LONV
350 IF I3<5 THEN C(1)=C(1)+(2*Y)
    :C(2)=C(2)+(3*Y):C(3)=C(3)+Y'LNSR
355 FOR X=1 TO 10:Y=INT(RND(1)*10)
    'HNKO
360 IF Y>6 THEN Y=Y-10'FGAH
365 C(X)=C(X)+(2*Y):NEXT'ENTN
370 FOR X=1 TO 11'DESG
375 IF B(X)=1 THEN P(X)=100
    :B(X)=0'FSQQ
380 P(X)=P(X)+C(X)'CMHJ
385 IF P(X)=<0 THEN P(X)=0:B(X)=1'GQMR
390 IF P(X)>199 THEN P(X)=INT(P(X)/2)
    :SP(X)=1'HAMQ
395 NEXT'BAEL
400 FOR X=1 TO 10:IF SP(X)=0 THEN NEXT
    :GOTO 410'IPCG
405 P1(X)=P1(X)*2:P2(X)=P2(X)*2
    :SP(X)=1:NEXT'GGPO
410 FOR X=13 TO(12+IP)'EJMD
415 IF B(X)=0 THEN NEXT X
    :GOTO 430'FKAJ
420 IF B(X)=1 THEN B(X)=2'EKGE
425 NEXT'BAEF
430 FOR X=13 TO(12+IP):GOSUB 1090
    :P(X)=P(X)+Y'HYBK
435 IF P(X)>0 THEN NEXT:GOTO 450'FJIK
440 IF B(X)=2 THEN NEXT:GOTO 450'FJWG
445 P1(X)=0:P2(X)=0:P(X)=0:B(X)=1
    :NEXT'FBSQ
450 Q=Q+1:IF Q=5 THEN Q=1:YR=YR+1'IOKM
455 IF NP=1 OR PL=1 THEN 470'FJYN
460 PL$=P2$:M=M(2):MT=M2:TL=M-MT'FXGN
463 FOR X=1 TO 20:S(X)=P2(X)
    :TL=TL+S(X)*P(X):NEXT'IDIT
465 GOTO 475'BDPK
470 PL$=P1$:M=M(1):MT=M1:TL=M-MT'FXDO
473 FOR X=1 TO 20:S(X)=P1(X)
    :TL=TL+S(X)*P(X):NEXT'IDHU
475 GOSUB 1035:IF TL<0 THEN
    BR(PL)=1'FPSQ
480 PRINT"[CLEAR]":PRINT"[HOME,BLUE]
    YEAR:"YR" QUARTER:"Q"[SPACE4]
    PLAYER: "PL$'CHUQ
485 PRINT"[BLACK]STK DIV PRC CHG
    [SPACE3]SHRS [SHFT -]STK PRC
    [SPACE3]SHRS"'BAAW
490 PRINT"[SHFT *3] [SHFT *3]
    [SHFT *3] [SHFT *3,SPACE3,SHFT *4]
     [SHFT -,SHFT *3] [SHFT *3,SPACE3,
    SHFT *4]"'BAME
495 FOR X=1 TO 12:Y=LEN(STR$(S(X)))
    :Y1=LEN(STR$(P(X)))
    :Z=LEN(STR$(C(X)))'MKGD
500 PRINT"[BLUE]"N$(X)"
    "D(X)SPC(4-Y1)P(X)SPC(3-Z)C(X)SPC
    (6-Y)S(X)"[BLACK,SHFT -]"
    :NEXT'IHBN
505 PRINT"[SHFT *23,CMDR X]"'BAXW
510 IF PL=2 THEN 585'DGID
515 IF Q<>1 OR YR>8 THEN 525'GIWK
520 GOSUB 1030:NW=1:IP=IP+1
    :PRINT SPC(6)"[BLUE]NEW ISSUE
    : "I$(IP)'GXEN
525 FOR X=1 TO 12+IP'EGGK
530 IF B(X)<>1 THEN NEXT:GOTO 545'GJXH
535 IF NW=0 THEN GOSUB 1030:NW=1'FLDM
540 PRINT SPC(6)"[RED]"N$(X)"
    DECLARES BANKRUPTCY":NEXT'DIPM
545 FOR X=1 TO 11'DESK
550 IF SP(X)=0 THEN NEXT:GOTO 565'FKSJ
555 IF NW=O THEN GOSUB 1030:NW=1'FLJO
560 PRINT SPC(6)"[GREEN]
    "N$(X)" DECLARES 2-FOR-1 SPLIT"
    :SP(X)=0:NEXT'EPAQ
565 IF NW=0 THEN 585'DGPN
570 FOR X=1 TO 3000:NEXT'EHWJ
575 NW=0:L=15:GOSUB 985'DLUP
580 FOR X=1 TO 6:PRINT SPC(5)"
    [SPACE31]":NEXT'GHJQ
583 L=15:GOSUB 985'CHIM
585 PRINT"[UP]"SPC(23)"[BLACK,CMDR W]
    "'CDNP
590 IF BR(PL)=1 THEN PRINT"[SPACE2,
    RED,RVS]BANKRUPT[RVOFF]"
    :PRINT"[UP]"SPC(23)"[BLACK,SHFT -]
    ":GOTO 605'HPFV
595 IF MC>0 THEN PRINT:GOTO 605'FHDR
600 PRINT" [BLACK,RVS]B[RVOFF]UY
    [SPACE4,RVS]S[RVOFF]ELL[SPACE4,
    RVS]E[RVOFF]XIT[SPACE3,SHFT -]
    "'BATI
605 PRINT"[SHFT *15,CMDR R,SHFT *13,
    CMDR X]"'BAMD
610 PRINT"[HOME]":PRINT:PRINT'DCGD
615 FOR X=13 TO 12+IP:Y=LEN(STR$(S(X))
    ):Z=9-LEN(STR$(P(X)))'LDNT
620 IF B(X)=2 THEN NEXT:GOTO 630'FJWG
625 PRINT SPC(24)"[PURPLE]
    "N$(X)" "P(X)SPC(Z-Y)S(X)
    :NEXT'FUGP
630 L=10:GOSUB 985:PRINT SPC(23)"
    [BLACK,CMDR Q,SHFT *15]"'ELTU
635 PRINT SPC(26)" [ORANGE,RVS]
    INDEXES[RVOFF]"'CDUN
640 PRINT SPC(24)" ENERGY[SPACE4]"EN
    :PRINT SPC(24)" ECONOMY[SPACE3]
    "I2'ELTN
645 PRINT SPC(24)" INTEREST[SPACE2]"I3
    :PRINT SPC(24)" INFLATION "I1'ELRT
650 PRINT SPC(23)"[BLACK,CMDR E,
    SHFT *15]"'CDTT
655 PRINT"[GREEN]CASH="M
    :PRINT"COMM="CM:PRINT"MARG="MT'DH
    TS
660 PRINT"[UP3]"SPC(15)"[BLACK,SHFT -]
    ":PRINT SPC(15)"[SHFT -]"
    :PRINT SPC(15)"[SHFT -]"'GLPQ
665 PRINT"[SHFT *15,CMDR E,SHFT *23]
    "'BAPP
670 IF BR(PL)=0 THEN 680'DKAL
675 FOR X=1 TO 2000:NEXT
```

```
    :GOTO 1050'FMCR
680 IF MC=0 THEN 705'DGNL
685 L=15:GOSUB 985:PRINT" [RED,RVS]
    MARGIN CALL:[RVOFF]"MC'DKIV
690 PRINT"[UP]"SPC(23)"[BLACK,SHFT -]
    "'CDFM
695 GOSUB 825:MC=MC-X:IF MC>0 THEN
    PRINT"[UP2]"SPC(14)"[SPACE7]"
    :GOTO 685'JUDB
700 PRINT"[UP2] [BLACK,RVS]B[RVOFF]UY
    [SPACE4,RVS]S[RVOFF]ELL[SPACE4,
    RVS]E[RVOFF]XIT[SPACE3]"'BAIK
705 POKE 198,0'BFXH
710 GET A$:IF A$=""THEN 710'EIHG
715 IF A$="B"THEN GOSUB 735
    :GOTO 705'FJXM
720 IF A$="S"THEN GOSUB 825
    :GOTO 705'FJOI
725 IF A$="E"THEN 1050'DGJL
730 GOTO 705'BDLF
735 GOSUB 950:MR=0:PRINT SPC(21)"
    [BLACK]BUY ON MARGIN?"
    :POKE 198,0'FRHU
740 GET A$:IF A$=""THEN 740'EIKJ
745 IF A$="Y"THEN MR=1:GOTO 755'FJLP
750 IF A$<>"N"THEN 740'EFDJ
755 GOSUB 990:IF A$="X"THEN
    RETURN'FGCP
760 IF MR=0 THEN 775'DGKK
765 IF M-Z/2<-1000 THEN GOSUB 955
    :GOSUB 1020:GOTO 765'JTKV
770 MT=MT+INT(Z/2):M=M-INT(Z/2)
    :GOTO 785'JTES
775 IF M-Z<-1000 THEN GOSUB 955
    :GOSUB 1020:GOTO 775'ISTV
780 M=M-Z:IF X=0 THEN 795'FJFO
785 S(Y)=S(Y)+X'CJXR
790 Z=INT(X*.1)+1:M=M-Z
    :CM=CM+Z+10'JTUU
795 GOSUB 950'BDRQ
800 PRINT TAB(7)"[SPACE8]"SPC(4)"
    [SPACE20]"'DEFI
805 PRINT TAB(7)"[SPACE8]"SPC(4)"
    [SPACE20]"'DEFN
810 PRINT TAB(7)"[SPACE8]"SPC(4)"
    [SPACE20]"'DEFJ
815 GOSUB 950:PRINT"[GREEN]CASH="M
    :PRINT"COMM="CM:PRINT"MARG="MT'EL
    TR
820 GOSUB 890:GOSUB 950:RETURN'DIPH
825 GOSUB 990:IF A$="X"THEN 845'EJVN
830 IF X>S(Y)THEN GOSUB 960:GOSUB 1020
    :GOTO 830'GRAM
835 M=M+Z:S(Y)=S(Y)-X:GOSUB 790'FRJR
840 IF MT=0 THEN GOSUB 940:RETURN'FHQK
845 PRINT SPC(22)"[BLACK]PAY MARGIN?"
    :POKE 198,0'DJKS
850 GET A$:IF A$=""THEN 850'EIML
855 IF A$="Y"THEN 870'DFPP
860 IF A$="N"THEN GOSUB 940
    :RETURN'FGMM
865 GOTO 850'BDMO
870 C=22:GOSUB 980:INPUT"AMOUNT";
    X'DKLO
875 IF M-X<-1000 THEN GOSUB 955
    :GOTO 870'HNAV
880 IF X>MT THEN X=MT'EGJO
885 M=M-X:MT=MT-X:GOTO 795'FNGV
890 Z=LEN(STR$(S(Y)))'DJYP
895 IF Y>12 THEN 915'DGLT
900 IF Y=0 THEN RETURN'ECAF
905 L=Y+1:GOSUB 985:PRINT SPC(17)"
    [BLUE,SPACE5]"'FLDO
910 PRINT"[UP]"SPC(22-Z)S(Y)
    :RETURN'EJOJ
915 L=Y-11:FOR X=13 TO Y
    :IF B(X)=2 THEN L=L-1'KSJT
920 NEXT:GOSUB 985:PRINT SPC(32)"
    [PURPLE,SPACE6]"'EIHK
925 PRINT"[UP]"SPC(38-LEN(STR$(S(Y))))
    S(Y):RETURN'GQAR
930 PRINT TAB(19)"[RED]
    INCORRECT INPUT"'CDGM
935 FOR X=1 TO 2000:NEXT'EHVO
940 L=17:GOSUB 985'CHKJ
945 FOR X=1 TO 3:PRINT TAB(16)"
    [SPACE22]":NEXT'GIVU
950 L=17:GOSUB 985:RETURN'DIEL
955 PRINT TAB(19)"[RED]
    NOT ENOUGH MONEY":GOTO 965'DHWU
960 PRINT TAB(19)"[RED]
    NOT ENOUGH SHARES"'CDHP
965 FOR X=1 TO 2000:NEXT
    :PRINT"[UP2]"SPC(21)"[SPACE16]
    "'GLHX
970 PRINT TAB(19)"[SPACE18]"'CDPO
975 L=18:GOSUB 985:RETURN'DIFS
980 POKE 211,C:RETURN'CGWN
985 POKE 214,L:PRINT:RETURN'DHOT
990 A$="X":Y=0:GOSUB 940:C=22
    :GOSUB 980:INPUT"[BLACK]STOCK";
    A$'GVNW
995 IF A$="X"THEN GOSUB 940
    :RETURN'FGWV
1000 IF LEN(A$)<>3 THEN GOSUB 930
     :GOTO 990'HMHY
1005 FOR X=1 TO 20:IF A$=N$(X)THEN
     Y=X'HOTF
1010 NEXT'BAET
1015 IF Y=0 THEN GOSUB 930
     :GOTO 990'FJAD
1020 GOSUB 980:X=0:INPUT"[BLACK]
     SHARES";X:Z=X*P(Y):RETURN'GRRF
1025 PRINT"[BLACK] [SHFT *38]"
     :RETURN'CBIF
1030 PRINT SPC(13)"[ORANGE]
     *MARKET NEWS*":RETURN'DEAC
1035 TL=M-MT:FOR X=1 TO 20
     :TL=TL+P(X)*S(X):NEXT'JYAN
1040 IF MT>INT(TL/2)THEN
     MC=MT-INT(TL/2):RETURN'KRCH
1045 MC=0:RETURN'CEHE
1050 CM=0:TR=0'CHBB
1055 IF Q<>4 THEN D=INT(D(12)/4)*S(12)
     :GOTO 1065'JVYN
1060 FOR X=1 TO 11:D=D+D(X)*S(X):NEXT
     :D=D+(D(12)-3*INT(D(12)/4))*S(12)
     'OPEQ
1065 IF PL=1 THEN 1075'DHAH
```

```
1070 D2=D:D=0:PL=1:M(2)=M:M2=MT
     :FOR X=1 TO 20:P2(X)=S(X):NEXT
     :GOTO 65'LPVQ
1075 D1=D:D=0:PL=2:M(1)=M:M1=MT
     :FOR X=1 TO 20:P1(X)=S(X)
     :NEXT'KMWU
1080 IF NP=1 THEN PL=1:GOTO 65'FJUG
1085 GOTO 460'BDJH
1090 Y=INT(RND(1)*5):IF Y>2 THEN
     Y=Y-5'JNBL
1095 RETURN'BAQH
1100 Y=INT(RND(1)*3)+1:RETURN'GJHY
1105 PRINT:GOSUB 1025'CFOB
1108 IF NP=1 AND BR(1)=1 THEN PRINT"
     [RED] YOU ARE BANKRUPT"
     :GOTO 1150'HORO
1110 IF BR(1)=1 AND BR(2)=1 THEN
     1175'FQLB
1115 IF BR(1)=1 THEN GOSUB 2000
     :GOTO 1150'FPEG
1120 IF BR(2)=1 THEN GOSUB 2100
     :GOTO 1150'FPGC
1125 IF NP=1 THEN 1150'DHVE
1130 IF T1>T2 THEN PL$=P1$
     :GOTO 1145'FPVD
1135 IF T2>T1 THEN PL$=P2$
     :GOTO 1145'FPWI
1140 PRINT:PRINT"[RVS,BLACK]
      *NO WINNER*[RVOFF]"
     :GOTO 1150'DGHF
1145 PRINT:PRINT"[GREEN] "PL$"[GREEN]
      IS THE WINNER"'CEQJ
1150 PRINT:PRINT"[BLACK] [RVS]
     GAME OVER[RVOFF]--PLAY AGAIN?"
     :POKE 198,0'DHFJ
1155 GET A$:IF A$=""THEN 1155'EJJI
1160 IF A$="Y"THEN CLR:GOTO 0'FEYE
1165 IF A$<>"N"THEN 1155'EGWJ
1170 PRINT"[CLEAR]":END'CBFC
1175 PRINT"[RED] "P1$" IS BANKRUPT
     [SPACE5]"P2$" IS BANKRUPT"
     :GOTO 1140'CLBQ
1180 DATA BNK,2,FIN,6,UTL,5,CON,2,DEF,
     0,MFG,1'BKEK
1185 DATA GMC,3,TWA,0,EXO,4,MIN,0,BND,
     8,MKT,4'BKLP
1190 DATA WILDCAT DRILLING,
     GENETIC RESEARCH,GOLD NUGGET
     MINE'BVGQ
1195 DATA DIODE ELECTRONICS,
     URBAN DEVELOPMENT,
     TEXAS EXPLORATION'BAQX
1200 DATA ENERGY ASSOCIATES,
     DOOMS DAY MINING'BGME
1205 DATA WIL,2,GEN,5,GOL,2,DIO,4,URB,
     4,TEX,2,ENA,5,DOM,2'BWTL
2000 PRINT"[RED] "P1$" IS BANKRUPT
     [SPACE5,GREEN]"P2$" IS THE
     WINNER":RETURN'CHXE
2100 PRINT"[RED] "P2$" IS BANKRUPT
     [SPACE4,GREEN]"P1$" IS THE
     WINNER":RETURN'CHQF
```

END

Amiga Software Reviews/Leisure Suit Larry

Continued from page 44

your goal.

The Lost Wages Casino also consists of an adjoining hotel with eight principal floors and Cabaret that features such performers as a stand-up comedian and dancing girls. Lefty's Bar consists of a place to drink, back room, bathroom and secret room only accessible with a password. Look carefully throughout the bar to find this password (hint hint). The Lost Wages Disco allows you to show your stuff on the lighted dance floor and the Chapel has killed the career of many a bachelor, with "Over One Billion Served." Finally, the Quiki Mart offers such things as cheap wine, dirty magazines and prophylactics (what adult game could be without them?).

You get from place to place in Lost Wages by taxi cab. The cab driver is friendly and will take you where you need to go all night, as long as you pay him promptly. Paying him involves money and getting money means that you have to gamble in the Casino. There is a sneaky way around continuous gambling that you should know—it keeps *Leisure Suit Larry* from becoming an agonizingly endless round of blackjack or slots. I found it very easy to win at blackjack, so try this method for blackjack: Save the game. Then bet the maximum amount. If you win, re-save the game; if you don't win, restore the last saved game. In no time at all, you'll break the bank (possess $250) and will have enough money to spend on taxi rides and things from the Quiki Mart.

Another interesting part of *Leisure Suit Larry* is the use of close ups of the girls you are trying to seduce. When you talk to a girl, her upper body is shown on the screen in detail approaching that of digitized photographs—at the very least, clean and precise. The movements of these prospective lovers are realistic and their comments typical of anyone dealing with a nerd like Larry.

The parser is not the best that I've ever seen, yet it is adequate for what you need in this game. However, as most adventurers do, I tend to try exotic commands and object uses when I get frustrated. Alas, *Leisure Suit Larry* didn't recognize most of what I tried. These discouraging attempts are indications from *Leisure Suit Larry* that you should try to think in simple terms. I can't emphasize this approach enough, and it's the only real hint that I can give on how to play the game. Any puzzles in *Leisure Suit Larry* are fairly simple and require the use of common objects you find in the game and your common sense. The toughest thing you may encounter is obtaining the bottle of pills.

The characters that you will meet in the game are colorful and cute, typical of the night life that you are experiencing. You encounter a flasher, a group of sleazy people in Lefty's, a hooker and pimp, beautiful security guard, policeman (if you break the law), wino, drunk, bouncer and a cute little dog that walks up to you, wagging its tail, and relieves himself on your leg. All of the people have their own idiosyncrasies; finding out about them is half the fun. Don't forget about the girl of your dreams, either!

Two final elements of *Leisure Suit Larry* that round out an excellent design are the informative and attractive manual and package and the ability to access Workbench while playing a game. The manual tells you all you need to know and even includes a tutorial. Also, you can pull the entire game down as a window and use the Amiga Workbench that is "hiding" behind it. *Leisure Suit Larry* even tops everything off with good usage of the Amiga's sound chip. So, if you need to get away from the humdrum for a while, take Larry out for a trip to Lost Wages and let your hormones loose! ■

by Mark Jordan

The 128 Mode

CrossWord Creator

Explore the Commodore 128 in its powerful native mode. Some of the articles in this column may be technical, some not so technical—but we guarantee that they will spark your creativity.

For the past 13 years I have had students in my English classes (in my other life I'm an English teacher) create crossword puzzles based on Greek and Latin roots. This exercise in creating the puzzles is an even better learning experience than doing them (which ain't bad).

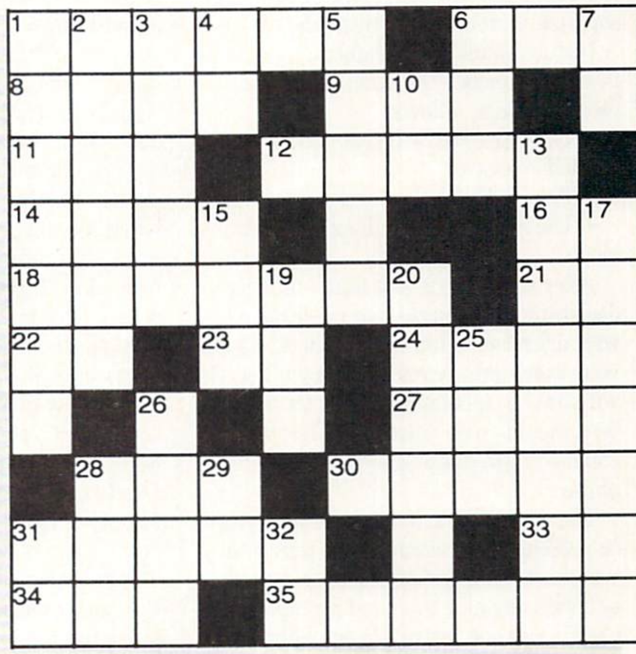
But year in and year out the same old problems crop up. Students makes mistakes then have to erase (keep in mind many of them do their puzzles in pen . . . in spite of the teacher's warnings), they number wrong (more erasing), they inadvertently connect two words into one gigantic tongue-twister (such as "orthohalio"), and they often proclaim halfway through, "This puzzle won't work," and decide to start all over.

The main reason for frustration is what I call the Paper Principle. Doing anything on paper will eventually get frustrating.

Heh-heh. You're a step ahead of me. Use the computer, right? Right! This program—CrossWord Creator—will help them. It'll also help you to design and edit your own crossword puzzles.

First, what it doesn't do: CrossWord Creator will not create crossword puzzles from word lists. It takes a whole gob of memory and processing time to do even a poor job of that. (I have yet to see a really good one.)

Now, what it will do: CrossWord Creator will work as a teammate with your brain. You come up with the ideas, type them into the computer, then edit to your heart's content. Don't like this word? Space over it. Want to change that word? Type over it. Got it the way you want it? Then ESCape the editing mode and let the computer number your puzzle, prompt you for clues, allow you to print both a blank puzzle and a key (and as many copies of each as you wish) with a nice big correctly-numbered grid and the clues neatly formatted beneath it.



ACROSS

1 The best way to grab some screen
6 The chip that runs sprites
8 How to get DATA
9 The R in RGB
11 A Booolean operator
12 What the TR in TRON stands for
14 The type of graph CIRCLE is good at
16 A Southwest state (abbr.)
18 The Amiga knocked a lot of this off
21 Has a range of 0-15 (abbr.)
22 Irish (abbr.)
23 Chr$(78) chr$(78)
24 Gateway to disk drive, screen, etc.
27 Buy cold cuts here
28 Called soda "back East"
30 Where to wait for a train
31 Just one in a "list of constants"
33 Statement to read paddle (abbr.)
34 Yoko ____
35 Split-screen mode interrupts this

DOWN

1 This statement has six modes
2 The 128's relationship to the 64
3 Where to light the candle (*Zork*)
4 Clipped form of "commercial"
5 Message programmers hate to get
6 The chip that handles 80 columns
7 BASIC abbreviation for CONCAT
10 Popular software company's logo
13 The 128 has 10 of these defined
15 A trig function (also human flaw)
17 The 1084 is the lastest one
19 The last command (theoretically)
20 SID can't do this, but a Swiss can
25 At 2 megahertz, the 128 has plenty
26 The villain of spaghetti code
28 Greek root meaning "all"
29 Unfortunate abbreviation for Purdue
31 7.0 alternate to FOR
32 Male title

I don't like to rave about my own creations, but this program is one you really should type in. If you're a mom or dad you can use it to conveniently make vocabulary-stretching puzzles for Junior. If you're Junior you can do a fantastic extra credit project for the teacher with the terms list at the end of the chapter. If you're a fellow looking for a way to make a little extra cash on the side, you might just discover the crossword puzzle freelance market wide open.

Type it in using the Magazine Entry Program to save on typos. It's not that long and has no machine language to mess you up and crash things if you don't get it just right. OK, Let's read the instructions.

Your first sign of life after running CrossWord Creator will be a prompt: How many columns? You can choose as few as two or as many as thirteen. Next you'll be asked: How many rows? Minimum here is two, maximum is ten.

After that you'll see a blank grid to your specifications onscreen with a cursor in the upper-left box. If you type any letter, it will go in that spot. The cursor, contrary to what you might expect, won't move. If you type another letter, it will erase the first and place the second in the same location.

Here's how you get the cursor to move out of that spot. Option 1: press any of the cursor keys. Option 2: press the plus (+) key. Option 3: press the minus (-) key.

What happens when you press a cursor key should be self-explanatory. The cursor will move. If you press cursor-up, it will go to the bottom of your column because there is no higher box to go up to. Press left and it'll go to the right-most box on your grid for the same reason.

What about Option 2, pressing the plus key? If you press it nothing will happen—yet. But type a letter again: it will end up in box 1; your cursor will jump to box 2. This allows you to type your words across just as you would with a word processor.

Option 3, the minus key, allows you to type your words down the grid. Press it and each time thereafter when you type a letter, the cursor will move down the col-

umn. It's quite handy.

There's a fourth cursor option: press the British pound key (£). It will put the cursor back in non-automatic mode.

Naturally, all the alphabetic keys work in the edit mode. The other keys that function are as follows:

• The space bar will clean out an unwanted character.

• The RETURN key will print a blank.

• The ESCape key will exit the editing mode.

After you've done just that—finished designing your puzzle—you will have to wait a few moments while your 128 sorts your words into Across and Down lists. It will also be calculating where the numbers should go on your grid. That done, you'll be moved into the "Write clues" phase.

The way this mode works is that you'll be presented the words in the puzzle (any two-character or greater unit going across or down) one at a time and prompted for clues. Only one restriction applies when writing clues: the computer won't allow clues longer than 36 characters. (For ideas on clue-writing, see "Tips on Puzzle Design" which follows.)

When the last clue has been entered, it's time to print out your puzzle. Please be sure to read the section called "Printer Notes."

That done, you're ready to watch it print. You will be very impressed at the professional results. Numbers in the upper-left corners of each box, clues arranged in two neat columns beneath—it's a kick to see your first puzzle roll off the assembly line.

And an assembly line it is. You can print as many copies as you want. And you won't want to forget to print a key of your puzzle, just in case you want to re-enter the puzzle at a later date. All these options are easy to follow with the on-screen prompts.

Have I got your interest piqued yet? I hope so. If not, read the sidebar accompanying this article. It may get you going. Crossword puzzle-making is a very enjoyable pastime.

Tips on Puzzle Design

The most important thing to remember if you want to do logical puzzles is to place a blank immediately following each word you enter. This means for both across and down words. If you don't, you may very well connect words together that you just don't want together.

The best place to start creating your puzzle is in the upper-left of the grid, right where the program starts you. Do an across word and a down word originating from block 1. Since there are absolutely no restrictions at this point, you'll have no problem choosing words. Next, place your blank after the across word, and complete the top row (if there are any spaces left).

From this point it is best to work in a northwesterly to southeasterly direction. Don't be tempted to fill in all those big open areas however you feel like it. If you do, you will impose future restrictions that will be extremely inhibiting.

A trick to avoiding problems is to try not to run too many words adjacent to each other. For example, if you have "alien" running across the first row and immediately beneath it you place "preacher," you'll have problems. Instead, put a blank in the box just beneath the "I" in alien. This will break up the pattern.

Of course, the best puzzles have the fewest blanks. So don't go hog-wild on the blanks.

Another good trick is to try to arrange words so that adjacent letters that line up alternate vowel/consonant. You can almost always get this pattern to make something.

Don't be afraid to use a dictionary to help you out of tough spots. I recommend it because it makes you smarter just to read the words. Also, use abbreviations cunningly. For "fun" puzzles, allow yourself the liberty to make up a few abbreviations to help you out of a tough spot. For example, on a puzzle I recently made, I had a "VO" standing as a unit. Instead of re-doing it, I simply gave the following clue: "Very Old (abbr.)."

Which brings us to the last topic: clue creating. The basic rule here is, anything goes. You could just give definitions of words, but that can get a little dry and technical. Instead, mix in some synonyms, a few "fill-in-the-blanks," some related-topic memory-triggers, and any other tricky idea that comes to mind.

Here are several ways to give a clue for "alien." "A non-native," "Name of scary movie," "______ Sedition Act," and "Rhymes with 'Daily in.'"

Oh, keep in mind the purpose and audience of your puzzle. If it is for Junior who is only eight years old, don't get your clues out of the *Oxford English Dictionary.* On the other hand, if the puzzle is intended for a magazine of sophisticated intellectuals like those who read *Commodore Magazine,* the "rhymes with" clues should be kept to a minimum.

Printer Notes

I purposely used generic printing as much as possible so it will work right with everybody's printer. The only two printer-specific codes are for underlining and line spacing. You will need to tailor three variables to suit your printer. They are found in lines 85 and 90. If your printer calls for a code different than—chr$(27) chr$(45) chr$(49)—for underlining, then change the UN$ in line 85. Likewise, change the UF$ variable to shut underlining off on your printer.

You'll need to read your printer manual a little more carefully to get the line spacing right. My printer, a Star NX-10C, requires the following to allow lines to print without any space between them: chr$(27) chr$(51) chr$(21). It takes chr$(27) chr$(51) chr$(36) to set spacing back to normal. If yours if different (it almost certainly will be), then change PC$ and PD$ in line 90 to suit.

If you'd like to put your printer in near letter quality mode or bold or emphasize mode, do it before you run the program (unless you have a printer with nifty panel buttons to do all that). I'll leave that up to you to work out.

If you just can't understand printer codes at all, you have two options: just delete lines 85 and 90 and don't worry about a perfect-looking puzzle or get a hacker friend over to mull it out. Nah, do it yourself. It'll be educational. ■

Answer



Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

CrossWord Creator

```
10 PRINT CHR$(14)"[CLEAR,SPACE2,
   SHFT C]ROSS[SHFT W]ORD [SHFT C]
   REATOR -- BY [SHFT M]ARK [SHFT J]
   ORDAN":SLEEP 2'DHFN
```

```
15 DIM X$(10),BL(13,10),AC$(99),
   DN$(99),CL$(1,99)'BRJK
20 COLOR 0,1:COLOR 4,1:COLOR 1,6'DLRC
25 GRAPHIC 2,1,21:WINDOW 0,21,39,
   24'CSEI
30 CL$="10":INPUT"[SHFT H]
   OW MANY COLUMNS (DEFAULT = 10)";CL$
   :CL=VAL(CL$):IF CL>13 THEN PRINT"
   [SHFT T]OO MANY":SLEEP 1
   :GOTO 30'KCJX
35 RO$="10":INPUT"[SHFT H]
   OW MANY ROWS (DEFAULT = 10)";RO$
   :RO=VAL(RO$):IF RO>10 THEN PRINT"
   [SHFT T]OO MANY":SLEEP 1
   :GOTO 35'KCPC
40 PRINT"[CLEAR]";'BBDB
45 S=4:IF RO/2<>INT(RO/2)THEN S=0'JNRO
50 UX=(13-CL)/2*24+S:UY=(10-RO)/2*16+4
   :LX=UX+CL*24:LY=UY+RO*16'QSAW
55 X=1:Y=1:DX=INT((UX+8)/8)
   :DY=INT((UY+4)/8)'KCJT
60 E$=CHR$(27):O$=E$+"O"
   :L$=CHR$(13)'GSDK
65 FOR T=1 TO 40:SP$=SP$+"[SPACE2]"
   :UU$=UU$+"[CMDR @2]":NEXT'ITQS
70 BM$="[CMDR M,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @,
   CMDR @4,SHFT @,CMDR @4,SHFT @]"
   :BM$=LEFT$(BM$,CL*5+1)'FRQD
75 M$="[CMDR M,SPACE4,CMDR N,SPACE4,
   CMDR N,SPACE4,CMDR N,SPACE4,CMDR N,
   SPACE4,CMDR N,SPACE4,CMDR N,SPACE4,
   CMDR N,SPACE4,CMDR N,SPACE4,CMDR N,
   SPACE4,CMDR N,SPACE4,CMDR N,SPACE4,
   CMDR N,SPACE4,CMDR N]"
   :M$=LEFT$(M$,CL*5+1)'FOMF
80 FOR T=1 TO 10:N$(T)=M$:NEXT'FNLJ
85 UN$=E$+CHR$(45)+CHR$(49)
   :UF$=E$+CHR$(45)+CHR$(48)'KCSV
90 PC$=E$+CHR$(51)+CHR$(21)
   :PD$=E$+CHR$(51)+CHR$(36)'KCBR
95 BOX 1,UX,UY,LX,LY'BNBO
100 FOR T=1 TO CL-1:DRAW 1,UX+T*24,
    UY TO UX+T*24,UY+RO*16:NEXT'NEVL
105 FOR T=1 TO RO-1:DRAW 1,UX,
    UY+T*16 TO UX+CL*24,UY+T*16
    :NEXT'NEWQ
110 CH$="ABCDEFGHIJKLMNOPQRSTUVWXYZ
    [UP,DOWN,LEFT,RIGHT]
    "+CHR$(13)+"+-[POUND]"+E$'FJNL
115 IN$=LEFT$(CH$,26)+"[SHFT A,SHFT B,
    SHFT C,SHFT D,SHFT E,SHFT F,
    SHFT G,SHFT H,SHFT I,SHFT J,
    SHFT K,SHFT L,SHFT M,SHFT N,
    SHFT O,SHFT P,SHFT Q,SHFT R,
    SHFT S,SHFT T,SHFT U,SHFT V,
    SHFT W,SHFT X,SHFT Y,SHFT Z]
    1234567890+-[POUND],./<>?
    :;=[]!#$%&'() [CMDR @]
    "+CHR$(34)+CHR$(20)+CHR$(13)'JXPP
120 CHAR 1,DX,DY," ",1:OV=1:RV=0'DSID
125 PRINT"[RVS,BLUE,SPACE5,SHFT U]
    SE CURSOR KEYS TO SELECT BOX
    [SPACE6]"E$"M"'BCHN
130 PRINT"[RVS,GRAY3] + FOR ACROSS
    TYPING, - FOR DOWN TYPING "'BATJ
135 PRINT"[RVS,CYAN] [POUND]
     TO SHUT OFF AUTOMATIC CURSOR
    MOVEMENT"'BAOP
140 PRINT"[RVS,L. BLUE,SPACE2,SHFT R,
    SHFT E,SHFT T,SHFT U,SHFT R,
    SHFT N] TO CREATE BLANKS, [SHFT E,
    SHFT S,SHFT C] TO EXIT[SPACE2]
    "'BAYO
150 DO'BAJA
155 GET KEY A$:A=INSTR(CH$,A$)
    :IF A=0 THEN 155'HSLN
160 IF A$=E$THEN EXIT'EEIE
165 IF A>27 THEN BEGIN'EEMJ
170 CHAR 1,CX+DX,CY+DY,LE$,RV
    :RV=0'EWPK
175 ON A-27 GOSUB 320,310,330,300,340,
    365,370,375'DJCP
180 X=(CX/3)+1:Y=(CY/2)+1'GPGK
185 IF BL(X,Y)=1 THEN RV=1:OV=0'FPDP
190 LE$=MID$(X$(Y),X,1)
    :IF LE$=""THEN LE$=" "'GVBM
195 CHAR 1,CX+DX,CY+DY,LE$,OV
    :OV=1'EWKR
200 IF A$=L$THEN 225'DHGY
205 BEND:GOTO 235'CFPD
210 IF BLANK(X,Y)=1 THEN CC=0
    :GOSUB 350:BL(X,Y)=0'GCXH
215 RV=0:LE$=A$:X$(Y)=LEFT$(X$(Y)+SP$,
    X-1)+A$+MID$(X$(Y),X+1)'KPLS
220 CHAR 1,CX+DX,CY+DY,LE$,OV
    :OV=1'EWKG
225 IF DI=1 THEN POKE 208,1
    :POKE 842,17'FPAJ
230 IF DI=2 THEN POKE 208,1
    :POKE 842,29'FPEF
235 LOOP'BAKE
245 COLOR 0,5:PRINT"[CLEAR,BLACK,
    SPACE14,SHFT C]ALCULATING ...
    [SPACE11]"'CENP
250 GOSUB 380:REM FIGURE
    ACROSS/DOWN'CVDH
255 GOSUB 520:REM ASK FOR CLUES'CPVL
260 GOSUB 630:REM PRINT PUZZLE'CPBH
265 GRAPHIC 2,,21:PRINT"[CLEAR,SHFT P]
    RESS * TO PRINT ANOTHER, [SHFT K]
     TO PRINT [SHFT K,SHFT E,SHFT Y]
    "'CGOX
267 PRINT,"[SHFT A]DJUST PAPER
    FIRST."'BBRP
270 GET KEY A$:IF A$="K"THEN KE=1
    :GOSUB 630:KE=0:GOTO 265'JUWN
272 IF A$="*"THEN GOSUB 630
    :GOTO 265'FJYJ
275 PRINT"[CLEAR,SHFT D]
    O ANOTHER PUZZLE?[SPACE2,SHFT Y]/
    [SHFT N]"'BABQ
280 GET KEY A$:IF A$="Y"THEN RUN'GFBJ
```

```
285 IF A$<>"N"THEN 280'EFCM
290 GRAPHIC 0,1:END'CELH
300 CX=CX+3:IF CX=>CL*3 THEN CX=0'IOAG
305 RETURN'BAQC
310 CY=CY+2:IF CY=>RO*2 THEN CY=0'IOUH
315 RETURN'BAQD
320 CY=CY-2:IF CY<0 THEN
    CY=RO*2-2'IPQI
325 RETURN'BAQE
330 CX=CX-3:IF CX<0 THEN
    CX=CL*3-3'IPWJ
335 RETURN'BAQF
340 BL(X,Y)=1:CC=1'CMPF
345 X$(Y)=LEFT$(X$(Y)+SP$,
    X-1)+" "+MID$(X$(Y),X+1)'IDBR
350 XX=(CX*8)+UX+2:YY=(CY*8)+UY+2'IVIN
355 BOX CC,XX,YY,XX+20,YY+12,,1'DVYO
360 RETURN'BAQD
365 DI=2:RETURN'CEGK
370 DI=1:RETURN'CEFG
375 DI=0:RETURN'CEEL
380 FOR Y=1 TO ROW'DFNI
385 FOR X=1 TO CL:Z$=X$(Y)'EMBP
390 IF X<CL THEN BEGIN'EEAJ
395 IF X=1 THEN GOSUB 450
    :GOTO 410'FJJP
400 IF MID$(Z$,X-1,1)=" "THEN GOSUB
    450'GMCE
405 BEND'BBXE
410 IF Y<RO THEN BEGIN'EETC
415 IF Y=1 THEN GOSUB 480
    :GOTO 430'FJPI
420 IF MID$(X$(Y-1),X,1)=" "THEN
    GOSUB 480'GPRH
425 BEND'BBXG
430 K=0'BCTC
435 NEXT:NEXT'CBLH
440 RETURN'BAQC
450 IF MID$(Z$,X,1)=" "OR MID$(Z$,X+1,
    1)=" "THEN RETURN'JRBM
455 NB=NB+1:K=1:N$=MID$(STR$(NB),2)
    :N$(Y)=LEFT$(N$(Y),
    (X-1)*5+1)+N$+MID$(N$(Y),
    (X-1)*5+2+LEN(N$))'TJNI
460 P=INSTR(Z$," ",X+2)
    :IF P=0 THEN P=CL+1'IQPN
465 AC$(NB)=MID$(Z$,X,P-X)'DQOO
470 RETURN'BAQF
480 IF MID$(Z$,X,1)=" "OR
    MID$(X$(Y+1),X,1)=" "THEN
    RETURN'JUNQ
485 IF K=0 THEN NB=NB+1
    :N$=MID$(STR$(NB),2)
    :N$(Y)=LEFT$(N$(Y),
    (X-1)*5+1)+N$+MID$(N$(Y),
    (X-1)*5+2+LEN(N$))'VIEM
490 FOR T=Y TO RO'DELK
495 IF MID$(X$(T),X,1)=" "THEN T=RO
    :GOTO 505'GSLU
500 DN$(NB)=DN$(NB)+MID$(X$(T),X,
    1)'DAQG
505 NEXT'BAEE
510 RETURN'BAQA
520 COLOR 0,1:WINDOW 0,21,39,24,1
    :PRINT"[GRAY3,SHFT T]
    YPE A CLUE FOR EACH WORD"'DSRO
525 FOR T=1 TO NB'DEKI
530 IF AC$(T)<>""THEN X$=AC$(T):AD=0
    :GOSUB 550'HWUL
535 IF DN$(T)<>""THEN X$=DN$(T):AD=1
    :GOSUB 550'HWYQ
540 NEXT:RETURN'CBXE
550 PRINT"[RIGHT,HOME,DOWN]
    "LEFT$(LEFT$(SP$,(40-LEN(X$))/2)
    +"[RVS,L. BLUE]"+X$+"[RVOFF]"+SP$,
    39)'KATR
555 WINDOW 2,24,37,24:PRINT"[CMDR @,
    LEFT]";'CNJO
560 B$="":GOSUB 580:PRINT"[CLEAR]
    "'DHBI
565 WINDOW 0,21,39,24'BLBN
570 RETURN'BAQG
580 DO'BAJH
585 GET KEY A$:A=INSTR(IN$,A$)
    :IF A=0 THEN 585'HSFU
590 IF A=88 THEN GOSUB 620
    :GOTO 605'FKYN
595 IF A=89 THEN EXIT'EDFQ
600 B$=B$+A$'CGPC
605 PRINT A$O$"[CMDR @,LEFT]";'BFNH
610 LOOP'BAKB
615 CL$(AD,T)=B$:RETURN'CMHJ
620 IF B$<>""THEN B$=LEFT$(B$,
    LEN(B$)-1)'IOVK
625 RETURN'BAQH
630 GRAPHIC 0:PRINT"[CLEAR,SHFT I]
    F SPACING/UNDERLINING DON'T WORK
    RIGHT"'CCHQ
635 PRINT"ON YOUR PRINTER,
     CHANGE LINES 85-90."'BAER
640 PRINT"[RVS,SHFT T]URN ON PRINTER.
    [SPACE2,SHFT P]RESS [SHFT R]
    ETURN TO BEGIN."'BAHR
645 GET KEY A$:IF A$<>L$THEN 645'GKQP
650 OPEN 4,4'BDAG
655 TB$=LEFT$(SP$,(80-(CL*5))/2)'FTXR
660 PRINT#4,PC$'BFYH
665 PRINT#4,TB$" "LEFT$(UU$,CL*5)'DOJQ
670 FOR T=1 TO ROW:M1$=M$:M2$=N$(T)
    :M3$=BM$:M4$=M$'HILT
680 FOR I=1 TO CL:T$=MID$(X$(T),I,
    1)'FSGP
685 IF T$=" "THEN BEGIN
    :K$="[CMDR +5]"'FGWV
690 M1$=LEFT$(M1$,I*5-4)+K$+MID$(M1$,
    I*5+2)'JXUT
695 M2$=LEFT$(M2$,I*5-4)+K$+MID$(M2$,
    I*5+2)'JXXY
700 M3$=LEFT$(M3$,I*5-4)+K$+MID$(M3$,
    I*5+2)'JXBL
705 M4$=LEFT$(M4$,I*5-4)+K$+MID$(M4$,
    I*5+2)'JXEQ
710 BEND:GOTO 720'CFOE
715 M4$=LEFT$(M4$,I*5-2)+T$+MID$(M4$,
    I*5)'IWQR
720 NEXT'BAED
730 IF KE=1 THEN M5$=M4$
    :ELSE M5$=M1$'GQUL
735 PRINT#4,TB$M2$'BIJL
```

Continued on page 128

by Bruce Jaeger

Simple Windowing

for the Commodore 128

The Commodore 128's powerful WINDOW commands enable us to easily print new information over the text on an existing screen. However, we may want to restore the original screen after the user has read the information in the text window. It's not always feasible to just reprint everything either—a lot of user-supplied information, input prompts, etc. may be mixed in requiring a lot of fancy programming just to remember how to reprint the screen!

A far simpler way is to "memorize" the original screen before printing over it with the new window information, and then restore the original screen byte-for-byte when done reading the window. While this can be done directly in BASIC, it would be far too slow for most uses, so I've written a machine language subroutine that will save and restore text *or* graphic screens.

Type in and DSAVE the demonstration program. When run, the demonstration will start by filling the 80-column screen with some nonsense text. Then, after you press a key, the ML routine will be called to "memorize" the contents of the 80-column screen (*including* the color attributes of each character). After the screen is memorized, a sample window will be opened in the center of the text. When you've read it, press another key and watch the ML routine replace the original almost faster than you can follow it!

(If you don't have your system set up for 80 columns yet, you can skip this part of the demonstration by inserting the following line in the demo program: 235 GOTO 380. This will skip the 80-column demonstration and go directly to the 40-column and graphics part of the program.)

Now a message prompts you to set your monitor to 40-column (graphics) mode for the next demonstration. The 40-column screen fills with the same nonsense text, and again you're asked to press a key. The ML routine is now called again (in a slightly different way described later), and the 40-column text screen is "memorized" before a window of new information is printed. Press a key to restore the original.

The third and fourth parts of the demonstration operate similarly, only this time the high-resolution (demo #3) or multi-color (demo #4) graphic screens are memorized, again with all colors! Because of the larger amount of bytes to "memorize" for the graphics screens, this is the slowest part of the demonstration—but the speed is still acceptable.

For Programmers

If you want to use the memorize/restore ML routine in your own programs, read on. Once the ML program is properly poked into memory, you can call its several functions as follows:

SYS 3072,0 : rem saves everything on the 80-column screen
SYS 3072,1 : rem restores everything on the 80-column screen
SYS 3072,2 : rem saves everything on the 40-column screen
SYS 3072,3 : rem restores everything on the 40-column screen
SYS 3072,4 : rem saves the graphic screen and colors
SYS 3073,5 : rem restores the graphic screen and colors

(No differentiation need be made between high-resolution and multi-color graphics—the ML routine automatically saves both color memories.)

No BASIC memory is "stolen" from you to use as a storage place. When you're in 80-column mode, I reasoned that you're unlikely to also be using the high-resolution bitmap area in Bank 0 from 8192 to 16191, so the 80-column screen is stored there. (Note that your 80-column program should somewhere execute a GRAPHIC 1 command before you try to memorize an 80-column screen, so that BASIC will move the program's beginning out of the high-resolution area of memory.)

On the other hand, when you're in 40-column or one of the high-resolution modes, there's 16K of 80-column video memory absolutely going to waste! So that's where I decided to stash the "memorized" 40-column and graphics screens. Accessing this 16K memory is a bit slower and trickier than regular RAM, but using any other chunk of RAM as a storage place would make it necessary to include memory-reserving POKEs in all of our programs, something I wished to avoid.

The machine language routine itself is located in the RS232 buffers starting at $0C00 (3072), so as written you can't use this with your own terminal programs. The machine language source code is included, so you can relocate and modify the program if you like. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30008, Shreveport, LA 71130-0007, 1-800-831-2694.

Simple Windowing

```
180 R$=CHR$(28) : Y$=CHR$(158)
    : SP$=CHR$(32)'GWXL
190 RV$=CHR$(18) : RO$=CHR$(146)
    : G$=CHR$(30)'GXCN
200 FOR X = 1 TO 21 : ES$ = ES$+SP$
    : NEXT'GPID
210 GOSUB 2080 : REM POKE IN ML'CNBB
220 PRINT G$; : REM GREEN'CJUB
230 COLOR 0,1 : COLOR 4,1
    : COLOR 6,1'DLRD
250 REM 80-COLUMN DEMONSTRATION'BWQH
260 IF RGR(X)=0 THEN PRINT "SWITCH TO
    80-COLUMNS!" + CHR$(7)
    : SLEEP 3'IKVP
270 GRAPHIC 1,1 : GRAPHIC 0,1'CHRG
280 DEF FN R(X)=INT(RND(1)*X)+1'HLKL
290 GRAPHIC 5,1 : CW=80
    : REM 80-COLUMNS'DTUL
300 BANK 15 : SYS 65378
    : REM ENSURES 80-COLUMN CHARS'DGNH
310 GOSUB 1400 : REM FILL SCREEN WITH
    WORDS'CYEF
320 GOSUB 1900 : REM WAIT FOR A
    KEY'CQBE
330 SYS 3072,0 : REM SAVE 80-COLUMN
    SCREEN'CBYH
340 GOSUB 1570 : REM PRINT "WINDOW"
    INFO'COKH
350 SYS 3072,1 : REM RESTORE ORIGINAL
    80-COLUMN SCREEN'CMSN
360 GOSUB 2000 : REM PAUSE'CKYG
380 REM 40-COLUMN DEMONSTRATION'BWML
390 GRAPHIC 5,1 : PRINT"SWITCH TO 40
```

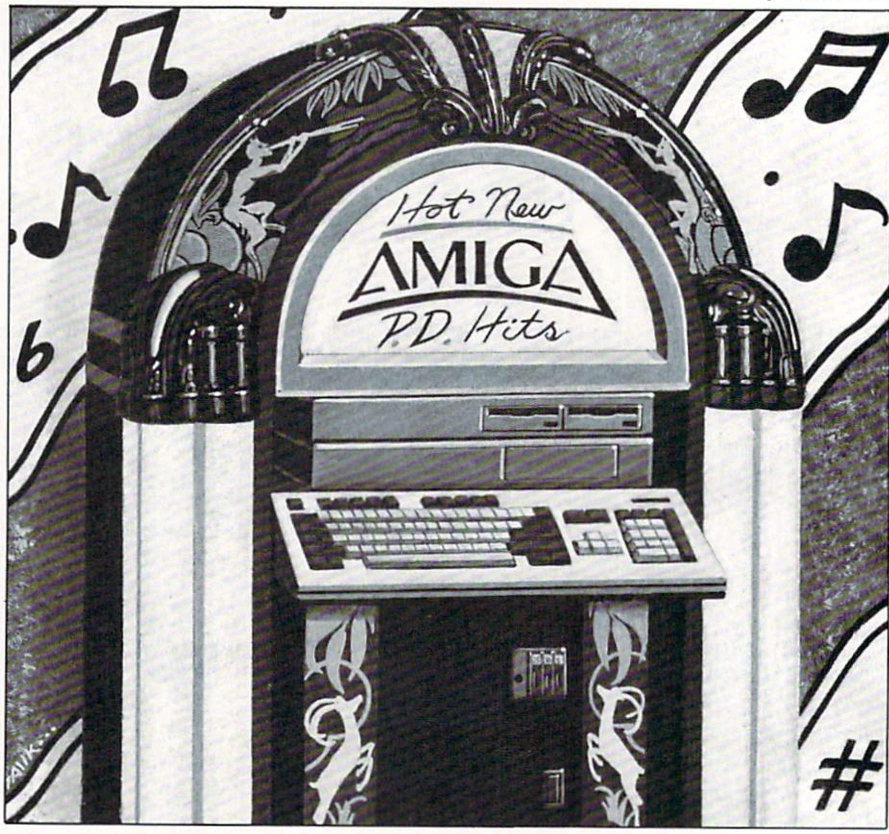
```
     COLUMNS!"'CEGN
400  GRAPHIC 0,1 : CW=40
     : REM 40-COLUMNS'DTHE
410  GOSUB 1400 : REM FILL SCREEN WITH
     WORDS'CYEG
420  GOSUB 1900 : REM WAIT FOR A
     KEY'CQBF
430  SYS 3072,2 : REM SAVE 40-COLUMN
     SCREEN'CBWI
440  GOSUB 1570 : REM PRINT "WINDOW"
     INFO'COKI
450  SYS 3072,3 : REM  RESTORE
     ORIGINAL 40-COLUMN SCREEN'CMQO
460  GOSUB 2000 : REM PAUSE'CKYH
480  REM GRAPHIC SCREEN DEMONSTRATION
     #1'BDKO
490  COLOR 1,8 : COLOR 0,1
     : COLOR 4,1'DLTL
500  WIDTH 1'BCYA
510  GRAPHIC 1,1 : REM HIGH-RES
     GRAPHICS'CUNG
520  BOX 1,0,0,319,100'BNEE
530  BOX 1,0,103,319,168'BPSF
540  BOX 1,100,130,219,142'BRAH
550  FOR X = 110 TO 219 STEP 7'EIKI
560  DRAW 1, X-10,142 TO X,130'DOLK
570  NEXT'BAEG
580  FOR X = 1 TO 50'DEVJ
590  CHAR 1,10,13,"STARSHIP
     GOOFYPRIZE",1'BKAQ
600  CHAR 1, 4,15,"WARP",1'BJBD
610  CHAR 1,30,15,"SHIELDS",1'BKFF
620  COLOR 1,2'BDRD
630  CHAR 1, 5,16,"7"'BHEF
640  CHAR 1,32,16,"29%"'BISG
650  COLOR 1,2'BDRG
660  FOR X = 1 TO 50'DEVI
670  H = FN R(300) + 10'DJXK
680  V = FN R(80) + 10'DITL
690  DRAW 1,H,V : NEXT'CGYL
700  COLOR 1,14'BESC
710  GOSUB 1900 : REM WAIT FOR KEY'CPLH
730  REM DRAW WINDOW INFORMATION'BVSK
740  SYS 3072,4 : REM SAVE GRAPHIC
     SCREEN'CYCM
750  COLOR 1,2 : CHAR 1,10,2,ES$,1'CQPK
760  COLOR 1,15'BETI
770  FOR X = 2 TO 13'DEVK
780  CHAR 1,10,X,ES$,1'BMCM
790  NEXT'BAEK
800  COLOR 1,7 : WIDTH 2'CGBF
810  BOX 1,84,19,244,106'BPAG
820  RESTORE 930'BDOF
830  COLOR 1,2 : CHAR 1,14,2,
     "STATUS REPORT",1'CNLN
840  COLOR 1,15'BETH
850  FOR X = 2 TO 10: READ A$'EHGK
860  CHAR 1,12,X+2,A$,1'CMML
870  NEXT'BAEJ
890  GET KEY A$ : REM WAIT'DHCO
900  SYS 3072,5 : REM RESTORE ORIGINAL
     GRAPHIC SCREEN'CKCN
910  GOSUB 1900 : REM NEXT DEMO
     MESSAGE'CULK
930  DATA "THIS IS A TEST OF"'BAYK
940  DATA "SIMPLE GRAPHIC-"'BAPL
950  DATA "SCREEN WINDOWING"'BAON
960  DATA "ON THE COMMODORE"'BASN
970  DATA "128."'BAEL
980  DATA " " , " "'BBNL
990  DATA "[SPACE2]PRESS ANY KEY"'BAHQ
1000 DATA "[SPACE3]TO CONTINUE"'BAVW
1020 REM GRAPHIC SCREEN DEMONSTRATION
     #2'BDLD
1030 COLOR 0,2 : COLOR 4,13'CIOY
1040 GRAPHIC 3,1 : REM MULTICOLOR
     GRAPHICS'CWUE
1050 FOR X = 1 TO 15'DEWA
1060 C1 = FN R(16)'CHMB
1070 C2 = FN R(16)'CHNC
1080 IF C1=2 OR C2=2 THEN 1060'FKOG
1090 COLOR 1,C1 : COLOR 2,C2'CJVF
1100 C = FN R(2)  : REM COLOR
     SOURCE'DRKA
1110 H = FN R(160) : REM X
     COORDINATE'DTAB
1120 V = FN R(200) : REM Y
     COORDINATE'DTKC
1130 W = FN R(20)+10 : REM WIDTH OF
     CIRCLE'EWCF
1140 U = FN R(30)+20 : REM HEIGHT OF
     CIRCLE'EXJG
1150 CIRCLE C,H,V,W,U'BJFC
1160 NEXT'BAEA
1170 REM A FEW RANDOM LINES'BPMF
1180 FOR X = 1 TO FN R(10)+5'FIGG
1190 C1 = FN R(16) : IF C1=2 THEN
     1190'FPYJ
1200 COLOR 1,C1'BEIV
1210 DRAW 1, FN R(160),
     FN R(200) TO FN R(160),
     FN R(200)'GDAF
1220 NEXT'BAEW
1230 COLOR 1,1 : GOSUB 1900
     : REM WAIT FOR KEY'DTLE
1240 SYS 3072,4 : REM SAVE
     GRAPHIC'CSQE
1250 REM PRINT WINDOW MESSAGE'BSXF
1260 RESTORE 930 : COLOR 1,1'CHOD
1270 FOR X = 1 TO 9'DDCE
1280 READ A$ : A$ = LEFT$(A$+ES$,
     17)'EPFI
1290 CHAR 1,3,X,A$,1'BKAG
1300 NEXT'BAEV
1310 GET KEY A$'CCEX
1320 SYS 3072,5 : REM RESTORE
     ORIGINAL GRAPHIC SCREEN'CKCI
1330 GOSUB 1900 : REM WAIT FOR
     KEYPRESS'CUCF
1340 COLOR 0,1 : COLOR 4,1'CHMD
1350 GRAPHIC 5,1 : GRAPHIC 0,1'CHVE
1360 SYS 65378 : REM ENSURE 80-COLUMN
     CHARACTERS ARE RESTORED'CRAO
1370 END'BACD
1400 REM WRITE WORDS TO FILL
     SCREEN'BWAE
1410 IF CW=80 THEN FAST
```

```
     : ELSE SLOW'GHJE
1420 RESTORE 1530'BEJA
1430 FOR X=1 TO 10 : READ W$(X)
     : NEXT'FLWF
1440 C=0'BCLC
1450 DO UNTIL C>23'DDNF
1460 W=INT(RND(1)*10)+1'FJBI
1470 W$=W$(W)'BHEG
1480 SS$=G$+SP$ : IF POS(0)=0 THEN
     SS$=G$'HSXN
1490 IF POS(0)+LEN(W$)+1 <CW  THEN
     PRINT SS$;W$; : ELSE PRINT
     : C=C+1'MWWT
1500 LOOP'BAKX
1510 RETURN'BAQY
1530 REM WORD DATA'BIDD
1540 DATA COMMODORE, WINDOW, TESTING,
      SCREEN, SWAP'BLAM
1550 DATA 128, YES, NO, BLAH,
      BLAH'BUMI
1570 REM PRINT "WINDOW" STUFF'BKEK
1580 RESTORE 1830'BEMH
1590 B$= R$+RV$+SP$+RO$+Y$'FPLO
1600 RESTORE 1830'BEMA
1610 H1= 8:H2=29:V1=14'DNMF
1620 IF CW=80 THEN H1=18:H2=60
     :V1=10'GSAJ
1630 MAX = H2-H1 : E=0'DKAG
1640 WINDOW H1-1,4,H2+1,V1+1,1'EQGJ
1650 WINDOW H1  ,5,H2+2,24'CMCI
1660 FOR X = 1 TO MAX+1 : PRINT B$;
     : NEXT : PRINT'HMKM
1670 READ A$ : IF A$="EOD" THEN
     1720'EJUL
1680 PRINT B$SP$A$;'BIBJ
1690 IF CW=80 THEN READ A$
     : PRINT SP$;A$;'FOUO
1700 PRINT TAB(MAX) B$'CGBC
1710 GOTO 1670'BELC
1720 FOR X = 1 TO MAX+1 : PRINT B$;
     : NEXT'GLFI
1730 PRINT'BACD
1740 IF CW=80 THEN 1760'DIEH
1750 PRINT TAB(5) CHR$(145);R$;RV$;
     "PRESS ANY KEY";CHR$(19);
     :GOTO 1780'FBOR
1760 PRINT TAB(9) CHR$(145);R$;RV$;
     "PRESS ANY KEY TO CONTINUE";
     CHR$(19)'EUAT
1770 PRINT CHR$(19);'CFKJ
1780 GET KEY A$'CCEJ
1790 WINDOW 0,0,CW-1,24'CLPM
1800 PRINT CHR$(30); : REM GREEN'DLLF
1810 RETURN'BAQC
1830 REM SAMPLE TEXT FOR WINDOW'BTJK
1840 DATA " THIS IS JUST SOME",
     "SAMPLE INFORMATION"'BBUP
1850 DATA "TO DEMONSTRATE HOW",
     "EASY IT WILL BE TO"'BBXQ
1860 DATA "ADD A SIMPLE FORM",
     "OF 'WINDOWING' TO"'BBAQ
1870 DATA "YOUR COMMODORE 128"
     "PROGRAMS."'BBWQ
1880 DATA "EOD"'BASK
1900 REM WAIT FOR A KEY'BLMF
1910 T=13 : IF CW=80 THEN T=32'FLTI
1920 PRINT CHR$(5);: REM WHITE'DKGI
1930 CHAR 1,T,24,"PRESS ANY KEY",
     1'BJJL
1940 SOUND 1,4000,4'BIPI
1950 GET KEY A$'CCEI
1960 CHAR 1,T,24,"[SPACE13]"'BHNL
1970 PRINT CHR$(30);: REM GREEN'DLLN
1980 RETURN'BAQK
2000 REM PROMPT FOR NEXT DEMO'BRMY
2010 T=6 : IF CW=80 THEN T=26'FKBA
2020 PRINT CHR$(5);'CEHX
2030 CHAR 1,T,24,"PRESS ANY KEY FOR
     NEXT DEMO",1'BJLH
2040 SOUND 1,33000,4'BJPA
2050 GET KEY A$'CCEA
2060 RETURN'BAQA
2080 REM ARK:  POKE MACHINE LANGUAGE
     INTO RS-232 BUFFER'BOHN
2090 REM TEST FOR ALREADY POKED
     IN'BVSJ
2100 IF PEEK(3072)=DEC("8D") AND
     PEEK(3073)=DEC("3E") THEN
     RETURN'KQFF
2110 RESTORE 2080 : PRINT"POKING IN
     ML..."'CFWB
2120 FOR J = 3072 TO 3390'DJMA
2130 READ A$ : POKE J, DEC(A$)'DJKB
2140 NEXT : SLOW : RETURN'DDRB
2150 DATA 8D,3E,0D,A9,00,8D,00,FF,20,
     1D'BESG
2160 DATA 0D,AD,3E,0D,C9,00,D0,03,4C,
     39'BEMH
2170 DATA 0C,C9,01,D0,03,4C,3F,0C,C9,
     02'BESI
2180 DATA D0,03,4C,45,0C,C9,03,D0,03,
     4C'BEBJ
2190 DATA 51,0C,C9,04,D0,03,4C,5D,0C,
     C9'BEAK
2200 DATA 05,D0,03,4C,78,0C,60,20,D7,
     0C'BEOC
2210 DATA 4C,AB,0C,20,D7,0C,4C,93,0C,
     20'BEGD
2220 DATA E5,0C,20,93,0C,20,F3,0C,4C,
     93'BEJE
2230 DATA 0C,20,E5,0C,20,AB,0C,20,F3,
     0C'BESF
2240 DATA 4C,AB,0C,20,01,0D,20,93,0C,
     20'BEKG
2250 DATA 0F,0D,78,A5,01,29,FE,85,01,
     20'BEAH
2260 DATA 93,0C,A5,01,09,01,85,01,58,
     60'BEWI
2270 DATA 20,01,0D,20,AB,0C,20,0F,0D,
     78'BENJ
2280 DATA A5,01,29,FE,85,01,20,AB,0C,
     A5'BETK
2290 DATA 01,09,01,85,01,58,60,A0,00,
     B1'BEFL
2300 DATA FB,AA,A9,1F,8D,00,D6,2C,00,
     D6'BEYD
2310 DATA 10,FB,8E,01,D6,20,C2,0C,F0,
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Continued on page 128

by Graham Kinsey

Amiga Public Domain Update



This month I have reviewed programs from Fish disks 119 through 128, plus many other programs from PeopleLink and local BBSs. A couple of the highlights this month are Play, the first public domain music player to appear for the Amiga, plus the latest version of the Virus Checker program from Commodore.

This month I have also taken a second look at some programs that have been updated since I reviewed them, including the terminal programs Handshake, AMIC PD TERM and Access!

For each program, the author is given along with the Fish or AMICUS series number (if applicable). Virtually all of the programs mentioned in this column are available for download in the libraries in PeopleLink's AmigaZone. When a public domain program has been classified as shareware, this is also mentioned, with the suggested amount.

Bankn: by Hal Carter
(Fish 120; Shareware: $20)

This is a complex checkbook program. In addition to keeping records of checks, Bankn allows you to define expense categories, prepare budgets that can set spending limits in each expense category, and split transactions over several checks. The program has an option which requires you to maintain a strict sequence on check numbers. Bankn can not only give you a report on your checking account, but can also allow you to define how the report will be set up. You can also reprogram certain variables concerning your account for the new year. One problem with Bankn's window is that it has no depth gadgets, making it difficult if not impossible to access any other windows on the same screen, including any CLI windows.

EgyptianRun: by Chris Hames
(Fish 120; Shareware: $10)

A so-so game in which you must steer through a minefield of pyramids to get within guided missile range of the control pyramid.

IconImage: by Denis Green

IconImage gives you the ability to easily swap an icon image with another icon image without affecting any related definition data attached to the icon.

DataPlot: by J. Dale Holt
(Fish 121; Shareware $10)

This is an AmigaBASIC plotting program that will work on any Epson MX-80/FX-80 or compatible printer. Several data files, online help and an accompanying least-squares program are also provided.

Plot: by George Trepal
(Fish 121; Shareware: $20)

This is a complex compiled AmigaBASIC program that plots any one of 35 different equations in 3D using color graphics. There are many options to the way the equations can be plotted. You can choose either a wire frame or a solid graph. Square or triangular cells can be used. When in wire frame mode, you can choose from simple, Xored or colored options. There are also many special effects available, including Haze, Backdrop and Shadow and Color cycling. Plotted graphs can then be saved for quick display, although you will have to pay the shareware fee in order to have this feature available to you.

Stairs: by Gary Cuba (Fish 121)

An AmigaBASIC program that creates a musical "stairs" illusion by increasing frequencies while modifying the volume according to a sine wave.

WBColors: by Stefan Lindahl

If you have a hard disk and like to run programs that expect their own palette (via the system-configuration file that is on the original disk), WBColors can quickly modify the Workbench colors upon bootup. Note that this program doesn't save anything to disk, so you'll have to remember to run it (or put in a special batch file that will also run the main application program) to get the color change.

Asteroids: by Rico Mariani (Fish 122)

This Asteroids clone has some excellent sound effects! Unfortunately, the graphic images are rather crude. However, all the graphic images are stored separately as an IFF file, meaning that you can easily edit them to almost any design you like. The sound files are also external to the program, so you can change those too if you like.

IFF2Pcs: by Ali Ozer (Fish 122)

A jigsaw puzzle for your Amiga. IFF2Pcs will break up any 16-color IFF

file into many pieces and then allow you to piece them back together again. You can choose from three sizes of pieces. The pieces are only squares for now, although the author hopes to change that soon.

Car: by Allen Hastings (Fish 123)

Car is a very nice *VideoScape 3D* animation of a sports car running over a traveling unicycle. This animation requires 1MB of memory in order to run.

Tarot: by L. Pfost (Fish 124)

This is sort of a training program for using the legendary tarot cards. This AmigaBASIC program contains nice graphic renditions of each tarot card, plus the meanings of each card (including reversal meanings).

Colour: by John Russell (Fish 126)

Yet another program to change the color palette for a particular program. Colour has other features, including the ability to grab the current palette from any screen and save it to disk. It also has the option of manipulating the present colors via slider gadgets or RGB values. Colour will act on other screens besides the active one by specifying the screen's title when calling up Colour from the CLI.

Iconify: by Leo Schwab (Fish 126)

Iconify can be considered a routine that allows programmers to extend the Workbench environment to any program running in a window. The iconify() routine adds one or more gadgets to the bottom of any window. When you click on one of these gadgets, the window will shrink to the size of an average icon, and an icon-like image will be present in the window. Not only can you drag the iconified window anywhere you want by grabbing the icon-like image, but if you double click on the icon-like image, the window will transform to original size, and the program will still be running, just as if you had double clicked on a real icon to start up a program. An accompanying demo program helps to show programmers some of Iconify's possibilities. Note that when the Iconified window is in shrunken form, the program is still running, as the demo program can clearly show you.

OnlyAmiga: by Iqbal Singh Hans (Fish 126)

Here is another nice *VideoScape 3D* animation. OnlyAmiga shows two inverted pyramids juggling three Boing balls while spinning on their tops.

DropCloth version 2.2: by Eric Lavitsky (Fish 128; Shareware: $10)

Version 2.2 of DropCloth is an update to the original version of DropCloth (reviewed in the October 1987 installment of this column). This version allows you to place any two bit-plane IFF image as a Workbench background instead of just a dot pattern.

MrBackup: by Mark Rinfret (Fish 128)

MrBackup is a hard drive backup utility that has the unique feature of speech synthesis. If you would rather wander from your Amiga to do other things while you are backing up your hard drive, or if you are running a program with a separate screen that obstructs the view of the backup program's windows, you might find MrBackup convenient. MrBackup can backup directories or groups of directories in addition to the whole drive. MrBackup has the option to compress all files while backing them up. You also have the option to specify a (Unix-style) wildcard for files that should not be backed up (including directories).

Paint: by Greg Lee (Fish 128)

The only remarkable thing about this primitive 32-color paint program is that it is written in the Web language (source is included).

wKeys: by Davide Cervone (Fish 128)

This program lets you use the keyboard to swap screens and windows to the front or back. The default mapping is to use combinations of the right AMIGA key, the right SHIFT key and the cursor keys to replace eight common flipping functions normally done via the mouse. You can, however, design your own mapping for the functions that are provided by wKeys, using virtually any combination of Amiga keys and qualifier keys.

AFacction: by Andry Rachmat

This is a public domain replacement for the Facction user interface program that is a part of the commercial floppy caching program *Facc II* by ASDG (reviewed in the April issue of *Commodore Magazine*). AFacction has all of the power and flexibility of Facction, but does not have a window and is only accessed via the CLI. It has a couple of new options that Facction doesn't, including an easy way to obtain a complete report about the cache.

ASetPrefs: by Arshiz Zarrabi

Do you dislike having to use the Preferences program to change certain settings on your Amiga? Although you will still have to use Preferences to *create* settings, you won't necessarily have to use Preferences to *change* settings. ASetPrefs allows you to load a previously saved Preferences setting without having to load the Preferences program. It can do this since each time Preferences settings are saved they are filed under "System-Configuration" inside the devs directory. So all you do is copy the current settings to somewhere else and then rename them. ASetPrefs can then load in those settings and change your environment to reflect these new settings. ASetPrefs is small (884 bytes) and written in assembly language, so it is perfect to add into your startup-sequence.

ClockDJ: by David Jenkins

Here is yet another title-bar clock program. One of the nice things about ClockDJ is that you can choose the foreground and background colors for the clock (from the four Workbench/CLI colors, of course). You can also change both the task priority of the program as well as the refresh rate of the clock display. All of the various settings can be saved to disk and later automatically accessed when the program first loads.

Handshake version 1.50a:
by Eric Haberfellner (Shareware: $25)

This is the latest version of Handshake, a terminal program specializing in VT-52/VT-100/VT-102 emulation, originally reviewed in the October 1987 installment of this column. Handshake has come a long way since that first review. It is now widely regarded by Amiga users as the best Amiga terminal program, public domain or commercial, in terms of VT100 emulation.

Handshake has improved in many ways. It now supports Xmodem-CRC, Ymodem, Ymodem-batch and Kermit protocols. Auto-dialing is now available. Phone numbers can be saved (with the necessary parameter settings) as Workbench icons, and then you can click in the icons and have Handshake automatically load and dial the phone number. Handshake now fully supports 132 columns on the screen. You can choose whether the cursor blinks or not. And there are five function keys that can be user defined. Included with the program is a review in which Handshake (version 1.21, which is now way out of date) is compared to four other programs including Dave Wecker's VT100, and the commercial programs *A-Talk* and *Diga!*

FAUGAnim: by Leo Schwab

An impressive animation that commemorates the second anniversary of First Amiga Users Group and apparently takes advantage of Extra-Half-Brite mode. This animation requires 1MB of memory in order to run.

Hastings: by Allen Hastings

This is an aptly-named *VideoScape 3-D* animation that combines the effects of Allen's well known El Gato and VideoScape (the one shown in the Amiga 500 commercials last fall) animations.

Play: by Mark Riley (Shareware: $10)

Finally, somebody has come out with a public domain music player! Mark Riley, author of the commercial music program *Sonix* (from Aegis Development), has released Play, which is a shareware player for *Sonix* songs. Play supports script files that enable you to play a series of songs. The script support for Play includes specifying how many times to play a song, looping and volume control. Now those who don't own *Sonix* can actually listen to *Sonix* scores (assuming, of course, that the score doesn't require any of the instrument files on the original *Sonix* disks, since they are copyrighted and are obviously *not* in the public domain). These include the very popular Songs created in part with the commercial program *AudioMaster* (also from Aegis Development), YTV, YesSonix, Thriller and others.

The Final List: by Chet Solace

I wouldn't usually consider reviewing a text file, but this is no ordinary text file. The Final List is a BBS listing to end all BBS listings. The Final list (as of version 12.0) currently lists over 600 BBSs in the United States, Canada and across the world!

But this list is actually much more than a text file. For AMIC PD TERM users this list can be instantly used as a phone directory (granted, a *very* big one). Just load up the list from AMIC PD TERM's phone directory requestor and start dialing! Needless to say, keeping a list of this incredible size is a huge undertaking, and Chet Solace should receive a round of applause. For those of you who use AMIC PD TERM and PC-Pursuit, The Final List is a must-have.

AMIC PD TERM version .58E: by David Salas

This is an updated version of a full-featured telecommunications program last reviewed (in version .42) in the November 1987 installment of this column.

Before I talk about the many changes in AMIC PD TERM, I must address the current status of the program. As of January 1, 1988, AMIC PD TERM is no longer a shareware program. The registered version of AMIC PD TERM has been replaced by a commercial version called *AMICTerm* (which will receive a full-length review in a special article coming soon!). So until AMIC Development (the makers of AMIC PD TERM and now AMICTerm) indicates otherwise, I consider AMIC PD TERM not shareware any more, but rather just a freely distributable program like most Amiga PD programs (Although it is certainly *not* in the public domain in the strict sense of the word, as AMIC Development still reserves all rights to the program).

As for what has happened to AMIC PD TERM since version .42, the addition of the Ymodem protocol tops the list. AMIC PD TERM also supports Ymodem-batch, but only in the send mode. AMIC PD TERM now has its own title-bar clock that keeps track of both the current time and the amount of time spent online.

A configuration window is another big addition. This allows you to view the current values for four different parameter settings, change one or more of them, and then save the group of settings to the AMIC.Config file. There is also a new Instant Access window. For those who call AMIC Development's AMIC-2000 BBS, the Instant Access window allows you to instantly perform almost any function that you might do on the bulletin board by just clicking on the appropriate gadget.

AMIC PD TERM also supports script files, although some of the script functions are disabled (so that you have to buy the commercial version). AMIC PD TERM now allows you to unarc ARC archives without having to touch the CLI.

You can easily get rid of the Sidebar if it gets it your way—just double-click on the main window to push the Sidebar to the back (or if it's in the back, pop it to the front).

There is also a review buffer through which you can view text files or even binary files being transferred. You can also tell AMIC PD TERM whether to disable the upper half of the currently-used character set (which will reduce line noise garbage from messing up text displays), or allow it to be displayed (for displaying graphics characters of the IBM character set).

Other improvements range from many bug fixes to loads of nice-looking (and correctly operating) gadgets, and, even more important, increased speed in the program. In the October 1987 installment of this column I said that AMIC PD TERM was the new king of the hill in general-purpose PD terminal programs. Not only does AMIC PD TERM retain this title, but now it also clearly challenges the better *commercial* terminal programs, and embarrasses the worst.

Access! version .27: by Keith Young (Shareware: $20)

This is version .27 of Access!, a 16-color terminal program which I first reviewed in the January 1988 installment of this column. Access! was designed as a strikingly colorful terminal program and is still that. If you ever thought that a terminal program for the Amiga should be just as colorful as the Amiga can be, then Access! is your cup of tea. Access! is loaded with multi-colored windows, gadgets, requesters and other displays. Access! even allows you to pick foreground and background colors for text display. You can even choose the "shadow" color, which is used to create shadows behind gadgets.

Besides all the nice color goodies, Access! now has many more useful features than it used to. For example, Access! is unique in that it has two separate Fast-Menu bars (which, just like AMIC PD TERM's Sidebar, allow you to select commands by clicking on gadgets) that reside on the top and bottom edges of the screen. You can choose whether you want each Fast Menu on the top or the bottom of the screen. If you choose to have both Fast Menus on the same side, they each have a gadget which allows you to flip them so that you can access the one that is currently behind the other.

A big improvement to Access! is support of the same phone directory format that AMIC PD TERM uses, meaning that among other things you can now easily use The Final List with Access! Another nice addition to Access! is a text file reader, which allows you to easily read any text file (that is already saved as a disk file) without having to load up another program.

Also for those of you who are short on memory, you can define via Access!'s Config file to load as an eight-color program or a 16-color program (as of version .27 you can change the number of colors on the fly while Access! is running). Access! also sports a configuration window (similar in function to AMIC PD TERM's configuration window, although it is much simpler

to use since there aren't as many settings to worry about). Although Access! can't match AMIC PD TERM in terms of power and features, it still is a good terminal program with a few special twists. So if you are looking for a nice terminal program and color is an important consideration, then don't write off Access! until you try it.

Crown of Ardania: by Gary Yates (Shareware: $15)

This board game written in compiled AmigaBASIC is a cross between Risk and *Defender of the Crown* with medieval fantasy elements thrown in. Like in Risk, you play the part of a ruler of a certain territory in Ardania, and your ultimate goal is to wrestle control from all your opponents of the 16 territories in Ardania and rule the entire land. You collect taxes from each territory you control, which gives you the power to hire personnel for your army. You build your army of soldiers and knights to defeat opposing forces and occupy as many territories as possible.

Unlike both Risk and *Defender of the Crown,* you also have a third type of personnel—wizards. The wizards you hire don't fight directly, but rather bestow on you, the ruler, magic powers with which to cast spells to support your army and yourself. You can create magic weapons for your army, cause an opponent's army to run away in fear, turn an opposing ruler's gold into dust or summon armies of skeletal warriors to fight for you. In Ardania there are different types of terrain, which affect how many warriors can be recruited from the area and how much gold you can extract from the peasants in the form of taxes. One chaotic factor in Ardania is The Great Dragon, which can be summoned for help during the game, but who will help a ruler in unpredictable ways. Many of the features of the game are disabled in the shareware version, forcing you to send in the shareware fee in order to truly enjoy the game.

FileInjector: by Justin McCormick

If you have been less than pleased about the file requestor that is a part of an often-used program, then don't use it! FileInjector is a stand-alone file requestor program that can work with most any program. Upon loading, FileInjector will sleep in the background until you call upon it via a hotkey. After you have selected a file via FileInjector, the next time you click the mouse button the name of the file you selected will be automatically inserted. FileInjector can be user-defined to add text strings before and after the filename (for example, if you want to load a word processor while specifying a text file that the program should load in). You can also choose whether FileInjector should add the path of the selected file to the text string that is injected into the host program. The hotkey that activates FileInjector can also be user-defined.

LS: by Justin McCormick

LS is a powerful replacement for the AmigaDOS DIR command based on the Unix (Berkeley 4.3) "LS" Command. For starters, LS uses four columns to list files compared to DIR's two. LS also highlights directories by displaying them in red. LS also duplicates the features found in the AmigaDOS LIST command. Naturally LS supports Unix-style wildcarding in addition to AmigaDOS' pattern matching. LS can also sort listings by date or file size (and in either direction).

Mach version 1.5: by Brian Moats

This is version 1.5 of Mach, a multipurpose utility program. I reviewed version 1.2 of Mach in last month's column. The big addition to Mach is a title-bar clock. Not only can you program the clock to produce a beep regularly (the interval between beeps in user-definable), but you can also use an online meter to keep track of how much money you have already spent on an online service so far. Unlike all the other portions of Mach, the clock portion of Mach is available as a special version of Mach called MachClk. So if you are satisfied with your current clock program, you can just use Mach, which doesn't have the title-bar clock code inside.

Split: by Richard Lee Stockton

If you have been looking for a convenient way to break up large files in order to upload them to a local BBS or online service, Split offers a fresh approach. Split will actually break up a file into a bunch of smaller disk files for easy ARCing and up/downloading. You can specify what size each piece should be (from as small as 10K up to 1MB). Split can break up a file into a maximum of 35 parts.

TaskX: by Steve Tibbett

Like many other programs, TaskX will allow you to view the current tasks that are running as well as the current task priority of each task. What makes TaskX unique is that you can use it to alter in real time the priority of a running task! The program can be made to shrink down to a tiny bar for easy storage until you need it.

VirusCheck version 1.9: by Bill Koester

VirusCheck is a very important program that will check for the presence of a potentially damaging virus on a disk. This is an update to the version of VirusCheck reviewed in the March 1988 installment of this column. The new feature in this version is that it can now examine the boot block on any standard disk and tell you if it is standard or not. If not, it will notify you if the boot block is infected with either of the two currently known (by Commodore) viruses in existence.

YaBoing II: by Ali Ozer

YaBoing II holds so little resemblance to its predecessor YaBoing that is should be considered a separate program. YaBoing II does have a game concept like YaBoing, but that's where the similarity ends. The object in YaBoing II is to catch numbers and numerical operators that fly across your screen and perform mathematical operations with the caught characters that can give you as high a score as possible. The calculator used in this game is oriented to programming, including the use of a stack to hold numbers and operators already caught.

I have almost caught up with the backlog of public domain programs worth review consideration. I have a few programs I didn't get to this month, plus a new batch of AMICUS disks that I'm expecting, and other programs are bound to show up in next month's column.

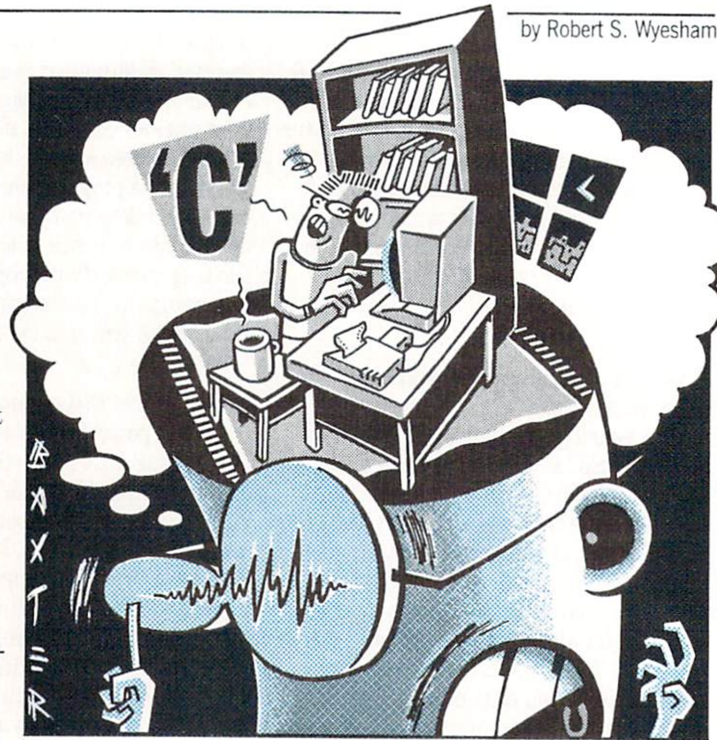
As always, I can be reached on the Amiga Zone on PeopleLink (ID: G KINSEY), or on the IDCMP BBS (617) 769-8444, 8p.m.-8a.m. If you have written a public domain/shareware/freely distributable program, or have obtained one that you think is worth mentioning to all Amiga owners, then please attempt to contact me via the above or through *Commodore Magazine.* See you next month.

Fish disks: *For a catalog, send a SASE and four loose stamps or $1 to: Fred Fish, 1346 W. 10th Place, Tempe, AZ 85281.*
AMICUS Disks: *$7 per disk, or send $1 for a catalog to: PiM Publications, P.O. Box 869, Fall River, MA 02722.*
PeopleLink: *(800) 524-0100*

by Robert S. Wyesham

The C Programming Environment

From A to B with Lattice C



ART BAXTER

Getting started with a compiled language like C isn't the easiest thing in the world. But the benefits of C are worth the effort, especially when the computer is as exciting as the Amiga. If you want to get started using your Lattice compiler, and you've never used a compiler before, I'll show you how to get organized for maximal programming productivity and minimal hassle.

Think of your programming environment as having three parts: 1) the information environment, 2) the physical environment, and 3) the operational environment. The first consists of books and other references. The second consists of the physical resources aside from the books. The third consists of files and where you keep them. I'll show you how to set up these environments and use them to greatest advantage. I've also included a quick pass through what C programmers call "The Loop."

If you want to get the most out of your Lattice compiler, you'll need:

- a printer
- an external disk drive or a hard disk drive
- 512K of RAM

The Information Environment

To speed your programming along you'll need these books:

- *AmigaDOS Manual*—indispensable for looking up DOS and Ed commands.
- a C tutorial—it should be loaded with examples, and the index must help you find discussions of fine points in seconds.
- a C reference manual—I like the *C Wizard's Programming Manual*, by W. David Schwaderer (Wiley Press, 1985), because I am not a C wizard; also consider *C: A Reference Manual*, by Samuel P. Harbison and Guy L. Steele, Jr. (Prentice-Hall, 1987)
- a Lattice manual—to look up errors, function arguments and returns, command-line switches, and more.

It's also a good idea to make a quick-reference card for Ed, the pure-ASCII, full-screen text editor that comes with the Amiga. For my quick-reference card, I made a one-page Ed command summary chart, which I taped to a piece of corrugated cardboard covered in clear packing tape to get a laminated effect.

The Physical Environment

The physical environment includes: the books mentioned above; a three-ring binder, for source listings and header file listings; and a disk holder, to keep tight control of your disks. The one I use, called "The Library," from Innovative Technologies/Communications, is a square carousel that holds eighty disks, twenty on a side which can be stacked three high. All of these items should be within arm's reach. The last item that must be within arm's reach is a separate table to hold your coffee cup. A computer that is dead from drowning makes the worst programming environment. I use a TV tray.

Make sure that every formatted disk has a label showing its name and describing its contents. Align the label's text so that it is right-side-up when you pop the disk in a drive. Write the name of the disk along the bottom edge of the label, so it is the last thing you see before the disk seats. This makes it very easy to check that you're inserting the right disk. It's important to label your disks with exact volume names, so you can be sure the disk is correct when a requester pops up with a disk request.

The Operational Environment

Your operational environment consists of the directories and files that you use to create or update a program. They should be organized to take full advantage of the system's power.

The previous two environments were easy to explain. Describing the operational environment is more involved, because there is much that needs changing. You'll be printing files, deleting files, modifying files, and more. When you are through with this section, you'll be ready to compile a program.

That won't be as hard as you think. It requires only a few simple commands. I'll step you through those commands by compiling a simple C program after I've described the creation of a highly effective operational environment. My sample compiler is Lattice's version 3.10, which comes on two disks. Use DISKCOPY to copy both disks, and put the originals away. Write-protect the copy of disk #2. From now on, when I mention either of the compiler disks, I am referring to your copy.

Compiler disk #1 will be your work disk, but there are only 25.6K bytes free on it. That's not enough disk space to hold more than a few source files, their object files, and the load module. My smallest load modules are about 10K—for very small, simple utility programs. You make space by deleting some unnecessary files.

Make sure that your printer is turned on and ready. Boot up your Amiga, using compiler disk #1 instead of Workbench. Then put compiler disk #2 in df1:. At the DOS prompt, type:

```
COPY read.me TO PRT:
```

Read.me is a text file of last-minute compiler changes, manual errata and advice. It is worth saving, but not on disk. Keep it in your binder. When the printer is done, delete "read.me." Also delete the files "on Lattice C," and "on Lattice C.info," which are

just used to display the contents of "read.me."

Next, type PREFERENCES at the DOS prompt in order to get into Preferences. Make sure that you have all the settings the way you like them and click on "save." When you have the DOS prompt back, delete Preferences and Preferences.info. Don't worry about losing your Preference settings; those are stored in another file called "system-configuration." If you ever want to change your preferences, just copy Preferences from a Workbench disk and invoke it as above.

You can also delete all of the printer-drivers that you don't use from the :devs/printers directory. These deletions will leave you with over 100K of space, which is plenty for beginners.

The Lattice-supplied Startup-Sequence has too much junk in it, and it's much too slow. So let's change it! At the DOS prompt, type "RUN Ed:s/Startup-Sequence". All of those "echo"s that you see in the file are very time consuming, because DOS has to load "echo" each time it is encountered. As a courtesy to Lattice, I leave the copyright notice. I have edited my Startup-Sequence so that it looks like this:

```
echo "Lattice AmigaDOS C Compiler Version 3.10"
echo "Copyright 1986, Lattice, Inc."
echo " "
makedir ram:c
path add ram:c
copy c:copy to ram:c
copy c:cd to ram:c
copy c:dir to ram:c
copy c:type to ram:c
copy c:delete to ram:c
copy c:execute to ram:c
copy c:assign to ram:c
assign QUAD: RAM:
assign LC: C:
assign INCLUDE: "copy of C_DISK#2:"
assign LIB: "copy of C_DISK#2:lib"
delete ram:c/assign
stack 10000
setdate
cd source
cd
```

This is the Startup-Sequence that I use. "MAKEDIR ram:c" makes a C directory in the RAM disk. DOS' usual (default) search for a command starts in the current directory. If it can't find what it's looking for there, it looks in the C directory of the boot disk (named "sys:"). But we're putting our favorite commands in the C directory of the RAM disk to speed things up, so we want DOS to look there before looking in sys:c. The next line takes care of this. It tells DOS to check ram:c before going to sys:c. You can check this by typing PATH at the DOS prompt.

The next few lines copy our favorite commands to RAM:c. If you have RAM to spare, copy every command in sys:c to ram:c. It sure saves time later. We also copy "assign" to ram:c to speed up the next four lines and then delete it when we're through with it. The assigns make the assignments required by the compiler driver, lc, the compiler's preprocessor, and the linker, blink.

Workbench comes with a stack size of 4000 bytes, too small for the compiler, so I increase it to 10000. If the compiler crashes the system, double the stack size. I put SETDATE near the end, so that when the Amiga prompts me for the date and time, I'll know that startup is almost over.

The last two lines change the current directory to your working directory, "source," and then tell you that you are, indeed, in the "source" directory. Save this file. Next make sure you're in the root directory, then type "MAKEDIR source". This will create the work directory that Startup-Sequence mentions. Now, reboot.

Editing and Compiling

The mechanics of programming are: 1) use Ed to create a source file—actually, all that's required is a pure-ASCII text editor, but you have Ed; 2) compile it to produce an object file (an object file, or object module, is mostly binary, but it usually contains a few ASCII strings; ".o" is the usual extension for object files); 3) use blink to link your object file with others and with the libraries; and 4) run the linked load file. If it doesn't work, you'll re-edit, re-compile, etc. Programmers call this "The Loop."

Actually, it should be called "The Loop for the Lucky," because you don't normally get as far as linking at first; syntax errors make sure of that. So, there is a shorter loop: the edit, compile, edit, compile. . . loop. The way to make this loop very fast is never to quit Ed during a session. You can run Ed in its own CLI with the command "RUN Ed mysource." By saving the source file with the command "ESC sa RETURN", you can save the file without quitting Ed. Next, shrink Ed's window, click in the other CLI window and compile. When the compiler's done, use "TYPE errfile" to examine the first few errors. Click in Ed's window, use "ESC m <line number> RETURN" to move to the problem lines, and make your corrections. That done, continue The Loop by entering "ESC sa RETURN". Let's write something!

A Sample Session

Make sure that you're in the "source" directory, and type "RUN Ed hello.c." Then type in this program:

```
#include "stdio.h"
void main()
{
printf("Hello, world!\n");
}
```

When you're finished, type "ESC sa RETURN", shrink Ed's window to the upper half of the screen, and then click in the other CLI window to activate it. Hit RETURN until the prompt appears. We will ignore the superabundance of compiler command-line options and simply type:

```
lc > errfile hello
```

The first word in this line, "lc," starts the compiler. The whole line compiles your hello.c file and sends all of your error messages to a file named "errfile" (which AmigaDOS creates in the current directory). When all disk activity has stopped for good, type "TYPE errfile". Stop the scrolling with the space bar, resume it with the backspace key. To go to a line with an error, click in the Ed window, and type "ESC m <line number> RETURN". Remember that an error may actually occur on a line before the line that gets the blame, but never after that line. Don't be alarmed if you get a zillion errors. Most of them are bogus errors issued by the compiler when it gets confused by a few genuine errors. Correct the first error, and the second, if it's really there, then save all (remember: ESC sa RETURN), click in the other CLI window, and recompile. You'll know that you've made it when errfile has the line: Total files: 1, Compiled OK: 1.

For large source files with lots of errors or even a small file

with just a few errors but with a tricky flow of control, it's often convenient to have a printout of the file, with every line numbered. This is called a numbered source listing. To create such a listing, use the "TYPE" command like this:

```
TYPE FROM <sourcefile> TO PRT: OPT N.
```

You still have two hurdles to jump after hello.c compiles, namely, linking and running. Hello.o, the output of the compiler, has two symbolic names in it, the internal names of the function "main," and the function "printf." (Those names, "—main" and "—printf" are the ASCII strings mentioned above). The linker, blink, reads through the object file that you give it, trying to replace symbolic names in the object file with subroutine calls to the code that implements the functions. This is called "resolving names." For example, the command to link hello.o is:

```
BLINK FROM LIB:c.o+hello.o TO hello LIB LIB:lc.lib+
    LIB:amiga.lib NODEBUG
```

(Do not press RETURN until the end of this line.) The object file c.o is the startup code for every program, hence, must always be linked and furthermore, must always appear first in the link command. Because the name after "TO" in the link command is "hello," the name of the load file is "hello." The word "LIB" is short for "LIBRARY." It tells blink where else to look if it still has names to resolve after scanning hello.o. BLINK looks in special files called "libraries," which Lattice supplies with the compiler. "LIB:" comes from the Startup-Sequence and tells blink where to find the libraries. Check Startup-Sequence now to see where the libraries are. "NODEBUG" suppresses the generation of special debugging information. We're not yet sophisticated enough to use that information.

If you haven't entered the link command above, do so now. When the linker's through, type hello at the DOS prompt. If the Amiga responds with:

hello, world!

Congratulations! You're a C programmer! If not, remember that the assigns in Startup-Sequence are required, the spelling in the link command must be exact, even down to the presence or absence of spaces, hello.o must be in the current directory (still the "source"), and c.o must be in the directory "C_DISK#2:lib."

When you're developing programs, you could type that blink command over and over, a thing to be avoided at all costs. The best way to avoid it is to automate as much as possible by using scripts and "with" files. You can use "with" files to store parts of the blink command line that normally don't change between invocations of blink. Here's how to make a "with" file: if you haven't quit Ed, do so now and then re-run it with a new filename, "plain.t". "Plain.t" will be the name of your new "with" file. In Ed, enter the two lines:

```
LIB LIB:lc.lib+LIB:amiga.lib NODEBUG
```

and then save the file and quit Ed, by hitting ESC X. The two lines in plain.t are just the tail end of the blink command line (hence the ".t" to signify "tail"). Now, delete "hello," and try to re-link hello.o by typing:

```
BLINK FROM LIB:c.o+hello.o TO hello WITH plain.t
```

When the DOS prompt comes back, type: hello. You should get the same result as before. If you didn't, remember that spelling in the "with" file and on the command line is crucial, and don't put spaces around the plus signs or it won't work! Also, plain.t should be kept in the "source" directory.

That's still too much typing. It's much more convenient to use this script, which supplies blink command lines for linking from one to four object files:

```
.key file1/a,f2,f3,f4,with/a/k
;
;the files "file1" and the with file are required on the command
;line, and the with file must follow the word "with"
;
IF "<f2>" EQ ""
blink FROM LIB:c.o+<file1>.o TO <file1> WITH <with>
ELSE
IF "<f3>" EQ ""
blink FROM LIB:c.o+<file1>.o+<f2>.o TO <file1> WITH
<with>
ELSE
IF "<f4>" EQ ""
blink FROM LIB:c.o+<file1>.o+<f2>.o+<f3>.o TO <file1>
WITH <with>
ELSE
blink FROM LIB:c.o+<file1>.o+<f2>.o+<f3>.o+<f4>.o
TO <file1> WITH
<with>

ENDIF
ENDIF
ENDIF
```

A script is a special file called a "command file," which contains AmigaDOS commands. When you tell the Amiga to execute a script, AmigaDOS reads the script and executes the commands in it just as though you had typed them at the console. A script may also contain parameters, which are variables and allow the script to be used with many different files. In the script above, "file1," "f2," "f3," and "f4" are parameters.

Use Ed to create this file (it's just another text file, no big deal), which you must call "link." When you've saved it, copy it to the "s" subdirectory, and delete it from "source." Delete "hello," again, and then link "hello.o" with the command line

```
EXECUTE link hello WITH plain.t
```

and test the results.

If your program uses floating point numbers, then you will have to include the Lattice math library, lcm.lib, in the link process (see p. 8 in the Lattice V.3.10 manual). I'll let you figure out a good name for this with file and what you should put into it.

Conclusion

There are three environments that you live in when you program: the information environment, the physical environment, and the operational environment. A defect in any of them will reduce your joy in programming. However, when they are complete as described, that joy will be enhanced. The result is that these environments will ease your real programming work, which is editing, compiling, linking and running. I've shown you how to make these environments pleasant and how to get the better of The Loop. C is a lovely language. Now you're in a better position to appreciate that loveliness. ■

The author would like to thank Amanda Krasinski, Esq., and Dan Baker for their very helpful criticisms of drafts of this article.

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thing in the wine cellar. The answer lies in *The Lore and Legends of Quendor* and in close examination of every room. The descriptions of room locations in *Beyond Zork* are sometimes of things necessary to your quest, but don't list them as objects. Read carefully!

- *The Lore and Legends of Quendor* contains hints about creatures and other things in *Beyond Zork*; without this knowledge you can't finish the game.
- Take careful note of what the old women in the shops say about the items that you bring to them for examination. The three shops you need to visit are: the Magick Shoppe in Gurth City, the Boutique in Mizniaport and the Weapon Shop in Accardi-by-the-Sea.
- Some magic items that you need may have to be bought from the Magick Shoppe. Most items that are useful in the earlier part of the game are found during your travels.
- Most magic items like staffs, sticks and rods give you only three tries to use them. You can only call upon the magic from scrolls and potions once.
- Not all creatures require a sword, dagger, club or other weapon to defeat them. Some other items may be perceived as "weapons" to them.
- The lighthouse is a good combination of combat and use of your brain power. There is a monster on every level to give you a real challenge.
- Some magic items aren't necessary to finish the game. They're put in as red herrings—only good for getting you more zorkmids. The Scroll of Mischief and the Scroll of Fireworks are such items. Save the game and try them for fun.
- Using rod/staff/stave-type items reduces your strength. Make sure that you have enough strength before using them.
- Author Brian Moriarty has used several names of Infocom staff members in various places in *Beyond Zork*. Chances are that if you see a strange name, it might be that of an Infocom staffer.
- When you sell something back to an old woman after using it, she'll only give you half of what you paid for it. No haggling is possible. Also, she'll charge you double for any item that you wish to buy back.
- Note carefully what effect the giant onion has. Perhaps one of your nemises could be affected in the same way.
- Without a doubt, you should be using the F7 function key (ATTACK MONSTER) very often. It saves a lot of typing. Also, programming one of the keys to type ASK WOMAN ABOUT saves your fingers.
- When monsters are defeated, they don't return. After the battle, you won't need any special items that you've used to defeat them.
- Read the labels on all scrolls and potions before you use them. They may contain special insctructions.
- To enter the gondola from either the dock or a tower platform, type GET IN GONDOLA. To get onto the platform, type JUMP ONTO PLATFORM.

Beyond Hints

Warning: Consulted these hints only if you're really stuck. They will get you a little further in the game but are useless if you don't have any of the items I've mentioned, haven't seen the monsters or haven't encountered the situations. That means that you haven't explored enough on your own yet!

- Kill the slug by putting salt on it. Logical, huh?
- Defeat the dorn by cutting the giant onion and attacking the monster while it is defenseless.
- Read the runes on the amulet through the wine bottle and use the amulet to get out of the wine cellar.
- Kiss the unicorn's horn to increase luck. This is another example of why you should read *The Lore and Legends of Quendor* carefully.
- Use levitation to release the unicorn, get the saddle and save the baby hungus.
- Use the rug to defeat the dust bunnies.
- Use the sea chest to defeat the monkey grinder.
- Look at the discipline crab's throne carefully.
- To move the onion, imagine that it was a giant beach ball. How would you move such a thing?
- The sea chest is a gateway to the Plane of TransInfinite Splendor. But do you really want to go there?
- To help the pterodactyl, you need the hurdy-gurdy from the monkey grinder, spenseweed and the magic saddle.
- Hide the footprints of the minx to save him from the hunters and increase your compassion. Use the minx to get something else you need.
- To get the jewel from the idol, anger the mother hungus by attacking her baby and have her follow you into the idol's maw. Try to get the jewel, teleport yourself out of the maw with some magic and use eversion on the mother hungus. ■

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have adopted this attitude, resulting in the inclusion of many magic puzzles in adventure games.

Often, posing the correct question is more important than furnishing the correct response to the other character's comments.

Magic takes many forms in adventures, including wands, potions, spells, scrolls, powders, clothing, weapons, armor, jewelry, creatures and enchanted objects. The use of these magical things is just as varied, but must be touched upon for you to grasp magic and use it to solve puzzles in adventure games. There are a few rules that you should follow to successfully use magic: find out what the object is or what it is called, discover the use of the object, experiment with the magic, save the magic for puzzles that seem to demand just such prestidigitation, don't overuse the magic, and examine the effect of the magic on yourself.

Discovering what a magical object is or that you have the ability to use some form of magic in an adventure is the first step in solving a puzzle using that magic. Usually, you are made aware that you have a certain ability through an instruction manual or by the game itself as you acquire that ability. These are automatic and require no extra effort on your part. However, in the case of magic items, you have three options: take the item to someone who may be able to evaluate it, examine the item carefully for any writing that may describe it or use some other magic to divine its purpose. Using one of these three methods, you should be able to find out the name of a magical item or ability or the essence of the item.

Next, you must know what the magic does. There are two ways of assembling this information: use the magic on something and note the reaction, or gain this information when first examining the ability or magic item (sometimes the purpose is revealed in the item or ability's name). If you just tried an unknown magic spell on a tree and it instantly died, then you might guess that the spell kills living things. Some magic requires gathering some ingredients or using it under special conditions. This information should be investigated as well when discovering the purpose of magic.

Experimentation with the magic is important in determining its overall use. If you only tried a potion on people, how would you know that it transformed plants into people or animals into plants? You couldn't. Only by multiple experiments with the magic will you find out what situations are best for its overall effectiveness.

Using the potion in *The Blade of Blackpoole* takes into account all the hints I've mentioned so far. In the game, there is a river that must be traveled, and there is a boat that is too heavy to move and far from the river. You find a potion that allows the reduction of the boat. By experimenting with it, you have found out this fact. If you use the potion on the boat, it shrinks, so you can then carry it to the river. When you drop the boat in the river, it returns to normal size. You have used the potion as it was meant to be used by careful planning and investigation of its properties.

Magic often works in five or six different situations, but it can only be used once. At this point, you have to make a choice of when to use the magic and when to use conventional means to solve a puzzle. You should save the magic for a puzzle that seems suited to the specifications of the magical effect. Most designers will create a puzzle in which only one type of magic will solve it efficiently. In the process of saving the magical items for the most useful situation, you have to spend most of the time finding the puzzles so that you may use the magic. All of this patience will pay off when you gather a new treasure, increase your points or win the game. So save that magical ability for a more appropriate time!

Some magical items and abilities can be used more than one time. This does not mean that they have unlimited use, however. Using the magic too often is worse than not using it at all. Unless you discover that there is no limit on the use of a magical item or ability, do not employ that magic at every turn in the adventure. There is a correct place for everything in a game. Just because a wand kills all enemies in sight does not mean that you should use it in all battles. Save it for exceptionally tough creatures and use physical weapons elsewhere.

Mazes have plagued man from the Egyptian pyramids to the advent of the personal computer.

Finally, it would be a good idea to examine the effect of the magic on yourself. A lot of adventures require that you use magic on yourself to solve a certain puzzle. Practically all adventure games allow you to save positions. Do this and try out all the magic, directing it at yourself. Note the effects and remember them in case you encounter a puzzle later that may be looking for just such a solution. A very good magician is impervious to most types of magic directed toward him. Because there are few such characters in an adventure, realize that even you, with the possibility of becoming a great hero by the end of the game, are subject to the same laws of magic as other inanimate objects and living things.

Taking all of these rules and tying them together results in a guide to use to tackle magic puzzles. The only thing that you must do if magic is allowed in a game is examine the puzzle and see if magic lends itself well to the solution. If you think it does, fire away. If the magic doesn't work, then you are looking in the wrong place for the answer. If some incredible event takes place or your score increases dramatically (or maybe just a little bit), then you have probably solved the puzzle correctly, and it really was one that required the use of magic.

Enchanter offers a puzzle that has baffled many adventurers, yet is simple to solve if you use your mind first before your fingers and the keyboard. There is a temple in the game from which you must retrieve something. However, the minute you enter the temple, you are jailed and then sacrificed. In the game, you have found a scroll, that contains an Ozmoo spell, the purpose of which is to survive an unnatural death. By casting the spell on yourself, you survive the sacrifice and can obtain the object.

Puzzles requiring magic for solution are usually those that have something happening that is opposite to and against the nature of the world in which the game takes place. Despite the fact that most of what is in an adventure game that might use magic is imaginary, those situations that go against the natural law must be corrected by unnatural means. Magic can thus be brought into play. Look for such puzzles, and you'll develop a skill for picking the right form of magic to use.

Logic Puzzles

Logic puzzles can be one of two types: those puzzles that take common knowledge and transform it into some type of puzzle and those puzzles that are almost like a game, but require you to use your mind. They are usually easy to solve, once you know the correct way to tackle them, but take the most intelligent adventurers down for the count. Logic puzzles come in all sizes, but difficulty is not based on size. One thing is for sure—they spice up any adventure and invite creativity into the game.

The first type of logic puzzle takes such common knowledge as the alphabet, colors of the rainbow, everyday objects and mathematical symbols and creates a puzzle out of them. As soon as you recognize the common sense knowledge that is contained in the puzzle, solving it becomes trivial. The key here is to think how you would logically manipulate such information to solve the puzzle. Sometimes, the knowledge is already coded into a puzzle and you have to decipher it. The examples that follow mirror these types of common knowledge logic puzzles respectively.

> Puzzles requiring magic usually have something happening that is against the nature of the world in which the game takes place.

In *Hollywood Hijinx* you find a business card with the name Roy G. Biv and computer punch cards in full color. In the basement you later find a computer-type console with a card slot. By placing the cards into the slot in the order of the colors of the rainbow (also the name on the card) and looking at the lights on the computer afterwards, you find a phone number to call to get another treasure.

In *Beyond Zork*, there is an inscription on a ledge that reads "My tines be long, my tines be short, my tines end ere my first report. What am I?" If you type SAY LIGHTNING, a bolt comes out of the sky and opens a hole in the ledge that goes into the lighthouse.

The first puzzle above takes your knowledge of what colors make up the rainbow and transforms them into a puzzle that you must solve. The riddle in the second puzzle already has the common thing encoded into a puzzle and you must decide what that thing is. In both cases, you are tested on your ability to recognize everyday objects in the solution to a puzzle. The key to solving this type of puzzle is not to think in complex terms, but to treat the barrier as a simple, logical rearrangement of something commonplace.

The second type of logic puzzle is more fun and offers a greater challenge to the adventurer. Typical logic puzzles of this type include physical puzzles that involve moving things around, wordplay or word games, anagrams, number puzzles and an assortment of other puzzles for which there is usually only one logical solution. The key to solving this type of puzzle is to work it out with pencil and paper—don't just think about it. Something physical tends to drive the solution into your consciousness a lot quicker. Often, such logic puzzles will distract you from the game for a few minutes—enough at least to take a short break—while deceptively still working on the game by solving one of its puzzles.

King's Quest I includes a neat logic puzzle that revolves around the coding of a name. You have to guess the name of a gnome to get past him and continue the game, but you have hardly any clues to help you. Turning to logic as a final arbiter, you guess that his name is Ifnkovhgroghprm. How do you get such a name? It's simple. Spell Rumplestiltskin using two alphabets as the code, with the second alphabet lined up in reverse order next to the normal-ordered alphabet. Makes you feel stupid, doesn't it?

> The key to solving this type of puzzle is to work it out with pencil and paper—don't just think about it.

Logic puzzles can offer a chuckle to the patient adventurer or can be downright annoying to the person who tries his hardest to solve the puzzle. That riddle from *Beyond Zork* took me a while to solve, even though the answer was quite simple. The solution to a logic puzzle depends on the puzzle. If it bears any resemblance at all to a word game or other game or puzzle that can be duplicated on paper or would appear in any of the numerous puzzle magazines, then the chances are good that it is a logic puzzle. Stay calm and use your brain power and you'll do fine.

Object-Oriented Puzzles

Most puzzles in adventure games are of this type. They either require you to use an object or combination of objects as they would normally be used to solve a puzzle or use some object in a unique way. The key to solving object-oriented puzzles is realizing the places that an object can be used and all the possible uses of an object. You know that a dagger can be used to fight, but it can also be used to cut an onion or reflect the sun. Realizing the potential of items is what "separates the men from the boys" in adventure games.

Using objects in the normal way requires finding a place for that object. A key will open a locked door, but maybe you haven't encountered a locked door. Also, most objects that are used normally in a puzzle are hidden somewhere else and require solution of another puzzle or extensive exploration to obtain them. Rarely do you find a key, money, weapons, armor, etc.—all things that will be performing as usual in the adventure—out in the open. They are usually in a hole in the ground, under a bed, behind a picture frame, in a river or hanging from a tree. Searching for these objects is the real work in utilizing them later on.

In *Transylvania*, you are constantly plagued by a werewolf. You know that you can kill the creature by shooting it with a silver bullet, but need to find one. You find the bullet in a coffin and a pistol in the Victorian house. The pistol is obvious, but the bullet—needed to make the pistol useful—is hidden in the coffin. Thus, the objects are used to kill the werewolf according to their inherent purposes.

Other puzzles require you to use an object in a role for which it was never intended, but still functions anyway. These puzzles require the most ingenuity and form the bulk of object-oriented puzzles. From lighting a candle by reflecting the sun from a mirror to lifting a heavy object by tying balloons to it, items can innovatively be given new purposes. The real meat in an adventure game puzzle lies in answering the question, "I wonder what you can do with that?" The answer to this lies in your imagination (and the hint book for the game, if there is one). Never underestimate a designer's thought process. If you designed adventure games all day and had to think up numerous puzzles, you'd probably come up with some real tough ones too.

Guild of Thieves has a puzzle which seems simple in retrospect, but was challenging and crafty while playing the game.

You have to catch a fish in a moat, but can't find a reel or rod. Improvisation is a necessity here. You have to bring together the pool cue, maggot thread and needle, all of which you should have found in your explorations. Put the maggot on the needle and tie the thread to the cue and you're ready to go fishing. In *Leisure Suit Larry in the Land of the Lounge Lizards*, you have to reach a bottle of pills on a window ledge from a fire escape. With no aid, you fall when you reach for the bottle. But if you read a magazine you've found, you should get the idea to tie yourself to the railing of the fire escape with a rope and then reach for the pills. These are just two of countless examples of object-oriented puzzles that require clever use of an object. Regardless of the way that you approach a puzzle, the one thing that should be constant is the movement of your brain cells and the contemplation of every possibility. Objects were placed in the game by the designer to either be red herrings or important inclusions. By thinking carefully about the game and its ultimate goal, you'll be able to decide how to use the many items available in any adventure game in solving object-oriented puzzles.

Two other things must be mentioned regarding the definitions of puzzles as we know them in adventure games. You might have wondered why I didn't mention role-playing games and the many types of puzzles that can't be solved unless certain requirements are met. In these games, actions that are restricted because of the level of a character or the value of his attributes will be allowed as these attributes are raised or new levels gained. These aren't really puzzles, be-

> You know that a dagger can be used to fight, but it can also be used to cut an onion or reflect the sun.

cause it's beyond your control to attack that difficulty directly. You can only hope that increasing your experience will offer access to new things. Attribute-based problems are not puzzles. Puzzles require use of objects, logic or your brain to bypass barriers in a game. If you have a problem in a role-playing game, I suggest that you look into the possibility that your character may be too weak or inexperienced in the realm of the adventure to solve that problem.

Also, finding a hidden object is not a puzzle. It is a test of your skill in examining objects, geography, locations, rooms, vehicles and landscape. A puzzle only exists if you have to do something special to obtain that hidden object, such as opening a safe by dialing the correct combination or using magic to break through a wall surrounding that item. Anything above and beyond normal means constitutes a puzzle of one of the other types; normal exploration is a skill you have to develop in playing adventure games.

Regardless of how you complete an adventure, you will undoubtedly encounter some things that will stump you and prevent you from moving further in the game. Don't give up, and never think that your difficulties will be over after solving one problem. Behind every good puzzle is another one waiting to ambush your confidence! ■

Tips & Tricks/64 and 128

Continued from page 16

```
100 PRINT"[CLEAR]128 EVASION - JOSE
    MIRANDA
110 FOR J=3601 TO 3646:POKE J,0:NEXT
120 FOR J=3602 TO 3627:READ K:POKE J,K
    :NEXT
130 SPRITE 1,1,2:CHAR 1,1,23
    :MOVSPR 1,170,100:COLLISION 2,180
140 J=JOY(2):K=INT(RND(8)*239)+1
    :PRINT TAB(K)"[SHFT Q]":S=S+5
150 IF J=7 THEN MOVSPR 1,270#3
    :SOUND 1,7500,1
160 IF J=3 THEN MOVSPR 1,090#3
    :SOUND 1,5000,1
170 GOTO 140
180 MOVSPR 1,0#0:PRINT"[HOME]
    GAME OVER -- YOUR SCORE IS:";S
190 FOR J=1 TO 3000:NEXT
    :PRINT"[CLEAR]":RUN 130
200 DATA 004,048,128,004,120,128,004,
    252
210 DATA 128,007,207,128,004,252,128,
    004
220 DATA 120,128,004,048,128,004,000,
    128
230 DATA 002,001
```

64 REMVERT: This little utility can highlight REM statements by putting their text in reverse field. Once a program has been "highlighted," the effect is permanent; the reversed REMs will even appear on most printer listings. I've found this effect very helpful in designing and editing my BASIC programs.

The program is written in BASIC, and pokes machine code into memory. It is fully relocatable and may work for other Commodore computers in addition to the 64. Since it works by placing a RVS code in the first position after the REM itself, it's a good idea to put an extra space there before doing the highlighting. Otherwise, you may lose the first character of your remark.

Mark Rea
Address Unknown

```
10 PRINT"[CLEAR]64 REMVERT - MARK REA"
20 SA=53000:REM  RELOCATABLE START
   ADDR
30 FOR J=SA TO SA+62:READ K:POKE J,K
   :CS=CS+K:NEXT
40 IF CS<>9980 THEN PRINT "ERROR IN
   DATA STATEMENTS":END
50 PRINT"[DOWN]TO PUT A PROGRAM'S
   REMS IN RVS FIELD,"
60 PRINT"JUST LOAD THE PROGRAM AND
   SYS";SA;"[LEFT]."
70 PRINT"[DOWN]IT'S BEST TO FIRST
   INSERT AN EXTRA"
80 PRINT"SPACE AFTER EACH REM
   KEYWORD.[DOWN]"
90 DATA 165,043,133,251,165,044,133,
   252
91 DATA 160,003,200,177,251,240,031,
   201
```

```
92 DATA 143,240,002,208,245,200,177,
   251
93 DATA 240,020,201,032,208,012,200,
   177
94 DATA 251,201,032,240,249,201,018,
   240
95 DATA 001,136,169,018,145,251,160,
   001
96 DATA 177,251,170,136,177,251,133,
   251
97 DATA 134,252,224,000,208,202,096
```

128 Function Key Conversions: Hexadecimal and CHR$ conversions are stumbling blocks to many who would like to learn assembly and machine language programming, not to mention those who aspire to be BASIC experts.

BASIC 7.0 has four functions (HEX$, DEC, CHR$, and ASC) that make these conversions easier, but the syntax of these functions can introduce stumbling blocks of their own. Even if you know where the parentheses, quotes and dollar signs are supposed to go, your fingers may be slow or uncooperative in putting them there.

But if you run the accompanying program, your conversions will be as close as your function keys. The program redefines keys to print the complete syntax for four different conversion functions. When the function key is pressed, the necessary characters are printed on the screen, with the cursor blinking in the position of the first character of the argument.

Type the argument, hit RETURN, and bingo, you've made your conversion.

Simon Tracy
Charlottesville, VA

```
10 REM 128 F-KEY CONVERSIONS - TRACY
20 Q$=CHR$(34)
30 KEY 1,"? DEC("+Q$+"[SPACE4]"+Q$+")
   [LEFT6]"
40 KEY 3,"? HEX$([SPACE5])[LEFT6]"
50 KEY 5,"? ASC("+Q$+" "+Q$+")[LEFT3]"
60 KEY 7,"? CHR$([SPACE3])[LEFT4]"
```

64 Function Key Colors: There's no more need to enter dozens of tedious Pokes to come up with suitable color combinations—this program makes it easy as F1, F2, F3!

Once the program has been run, those three keys change the border, background and character colors, respectively. This feature is particularly useful when you're testing color combinations for use in your own programs. I use it as a routine in larger programs, allowing the user to select his or her own colors.

Shukri Berisha
Mississauga, Ontario
Canada

```
10 PRINT"[CLEAR]64 F-KEY COLORS -
   SHUKRI BERISHA
20 FOR J=828 TO 922:READ K:POKE J,K
   :CS=CS+K:NEXT
30 IF CS<>10460 THEN PRINT"ERROR IN
   DATA STATEMENTS!":STOP
40 SYS 828:PRINT"[DOWN]PRESS F1,
    F3 & F5 TO CHANGE COLORS."
50 PRINT"[DOWN]STOP/RESTORE DISABLES
   THE FEATURE,":PRINT"SYS 828
   RE-ENABLES IT.[DOWN2]"
51 DATA 120,169,073,141,020,003,169,
   003
52 DATA 141,021,003,088,096,165,197,
   201
53 DATA 004,240,050,201,005,240,035,
   201
54 DATA 006,208,050,205,153,003,240,
   045
55 DATA 238,134,002,173,134,002,160,
   000
56 DATA 153,000,216,153,000,217,153,
   000
57 DATA 218,153,000,219,200,240,022,
   076
58 DATA 100,003,205,152,003,240,014,
   238
59 DATA 033,208,076,137,003,205,151,
   003
60 DATA 240,003,238,032,208,165,197,
   141
61 DATA 151,003,141,152,003,141,153,
   003
62 DATA 076,049,234,000,000,000,000,
   000
```

64 Color SYS: Here's another easy way to set the border, background and character colors on your 64. While the previous program is great for choosing colors from the keyboard, this one is best for setting predetermined colors from within a program.

Once the accompanying routine has been executed, SYS 828,BO,BK,CH will set your border, background and character colors, respectively. BO, BK and CH are the numbers from 0-15 that specify colors on the 64.

Dailah Hodge
Address Unknown

```
10 PRINT"[CLEAR]64 COLOR SYS - DAILAH
   HODGE
20 FOR J=828 TO 854:READ K:POKE J,K
   :CS=CS+K:NEXT
30 IF CS<>3012 THEN PRINT"ERROR IN
   DATA STATEMENTS!":STOP
40 PRINT"[DOWN]SYS 828,BO,BK,
   CH TO SET BORDER,"
50 PRINT"BACKGROUND AND CHARACTER
   COLORS.[DOWN2]"
51 DATA 032,155,183,138,072,032,155,
   183
52 DATA 138,072,032,155,183,138,141,
   134
53 DATA 002,104,141,033,208,104,141,
   032
54 DATA 208,096,000
```

Direct Machine Language SAVEs: It can be quite time-consuming to load those BASIC programs that contain machine language programs in DATA statements. After a little initial setup, it's faster and easier to load the machine language directly.

As an example of how this is done, consider the 64 Magazine Entry Program, found in the back of this magazine. When it is

run, this BASIC program creates a machine language program located in memory locations 49152-49900. The machine language program does all the work, and the large, slow-to-execute BASIC loader is needed only to get the machine language into the computer. But once the machine language is in memory, it's a simple matter to save it directly. The resulting file will load and execute much faster than the original BASIC.

To save the machine language on the 64, we must convert its starting and ending addresses into low byte-high byte format. Then we POKE those addresses into the memory locations that the SAVE command uses in determining what locations to save. Finally, we execute the SAVE command to save the machine language to disk.

The accompanying program can be used to automate the process. Save it before you use it, since it self-destructs when it runs.

To use the 64 ML Saver program, get your machine language into memory, taking note of its starting and ending addresses. Then load and run 64 ML Saver, assigning a unique filename to the machine language you want to save.

When the program is finished, you'll be asked to execute three statements to save your machine language. The statements will be printed on the screen, with the cursor flashing on the first one. Just press RETURN three times, and the SAVE will be accomplished.

Since this process corrupts some of BASIC's internal workings, you will have to reset your computer as soon as it's finished. If you don't have a reset button, you'll have to turn the computer off to reset it.

From now on, you can reload the machine language by executing LOAD"filename",8,1. Once it has been loaded, execute a direct-mode NEW command to prepare the 64 for BASIC.

If the NEW disturbs you, you can load the ML from within a BASIC program by using the following line at the start of the BASIC:

10 IF A=0 THEN A=1 : LOAD "filename",8,1

The IF. . . THEN is required because of Commodore BASIC's unusual handling of program-mode LOADs.

You 128 owners can use BASIC 7.0's BSAVE and BLOAD statements to directly SAVE and LOAD machine language. When you read the System Guide's explanations, remember that "binary file" means the same as "machine language file."

Roland Tobiasz
Nowy Sacz, Poland

```
100 PRINT"[CLEAR]64 ML SAVER - TIPS &
    TRICKS"
110 INPUT"[DOWN]FIRST ADDRESS TO
    SAVE";FA
120 IF FA<0 OR FA>65535 THEN 110
130 H1=INT(FA/256):L1=FA-256*H1
140 INPUT"[DOWN] LAST ADDRESS TO
    SAVE";LA
150 LA=LA+1:Q$=CHR$(34)
160 IF LA<FA OR LA>65535 THEN 140
170 H2=INT(LA/256):L2=LA-256*H2
180 INPUT"[DOWN]FILENAME";F$:L=LEN(F$)
190 IF L<1 OR L>16 THEN 180
200 PRINT"[DOWN]TO SAVE YOUR ML,
     EXECUTE THESE COMMANDS,
    THEN RESET YOUR COMPUTER:[DOWN2]"
210 PRINT"POKE 43,";L1;":POKE 44,";H1
220 PRINT"[DOWN2]POKE 45,";L2;"
    :POKE 46,";H2
230 PRINT"[DOWN2]SAVE";Q$;F$;Q$;",8,1"
240 PRINT"[UP11]"
```

Fanfare: This routine produces a sound effect that adds pizazz to title screens, game programs and special screen announcements of all kinds. If you use it as a subroutine, you'll have access to it whenever you like. As always, be sure that the variable names in the subroutine are different from important ones used in the body of the program.

Like most 64 sound routines, this one also works on the 128.

Joseph R. Charnetski
Dallas, PA

```
20 S=54272
30 FOR J=S TO S+23:POKE J,0:NEXT
40 POKE S+5,9:POKE S+24,15
50 FOR J=1 TO 20:READ K,L
60 POKE S+1,K:POKE S+4,33
70 FOR M=1 TO L*50:NEXT:POKE S+4,32
80 FOR N=1 TO 5:NEXT:NEXT
90 RESTORE
91 DATA 033,005,044,004,044,002,044,
   002
92 DATA 044,004,033,005,056,004,056,
   002
93 DATA 056,002,056,004,044,005,067,
   004
94 DATA 067,002,067,002,067,004,044,
   005
95 DATA 089,004,089,002,089,002,089,
   014
```

Bell Tone: To get a very nice bell sound on your 64, just execute the accompanying one-liner. The program has an interesting history.

When writing my own software on the 64, I've frequently needed a simple bell sound to signify an error or to tell the user that the computer has finished a job. But being an inexperienced sound programmer, my attempts to create a pleasing bell were rather unsuccessful.

The 128, on the other hand, has a built-in bell tone that is easily called from the keyboard or by a program. I examined the ROM routine that produces this nice sound, then translated it into this single line of BASIC.

You can use the program as is, or make it into a subroutine. It works identically on the 64 and the 128.

Ray Roberts
Gainesville, FL

```
100 REM BELL TONE - RAY ROBERTS
110 POKE 54296,21:POKE 54277,9
    :POKE 54278,0:POKE 54273,48
    :POKE 54276,32:POKE 54276,33
```

Screen Scrambler: Here's a machine language routine that decrements the screen code values of any displayed characters until the 40-column screen is cleared. It works anywhere in 64 or 128 memory that there are 50 free bytes. To relocate it, just change the variable AD to the new address.

Lines 100-130 are not part of the routine itself, but are included to demonstrate some interesting applications.

Chris Batchelor
Big Spring, TX

```
0 REM SCREEN SCRAMBLER - BATCHELOR
1 REM RELOCATABLE ML FOR 64 & 128
2 AD=4864:FOR J=0 TO 49:READ K
  :POKE AD+J,K:NEXT
3 DATA 169,004,133,251,160,000,132,250
4 DATA 132,252,177,250,201,032,240,015
5 DATA 162,001,134,252,201,000,208,002
6 DATA 169,033,170,202,138,145,250,230
7 DATA 250,208,231,230,251,165,251,201
8 DATA 008,208,223,165,252,201,000,208
9 DATA 207,096
99 :
100 REM DEMONSTRATIONS OF THE EFFECT
110 FOR J=1 TO 1000:PRINT"[L. RED,RVS]
    ";:NEXT:SYS AD
120 FOR J=1 TO 60:PRINT"[L. BLUE,RVS]
    0123456789876543210";:NEXT:SYS AD
130 FOR J=1 TO 24:PRINT"[YELLOW,RVS]
    GHIJKLMNOPQRSTUVWXYZYXWVUTSRQPONM
    LKJIHG":NEXT:SYS AD
```

Using BEGIN/BEND: Most BASIC 7.0 documentation states that BEGIN/BEND pairs are only useful when a single IF/THEN/ELSE structure extends over several program lines. What is often overlooked is that they are also valuable when multiple IF/THEN/ELSE statements are nested, even if only a single line is involved.

The accompanying demo program illustrates the principle. Line 20 prints out the wrong material for certain values of A and B, while line 30 gives the correct result for any A and B. To prove it, you can vary the values in line 10.
Nicholas G.D. Old
Baltimore, Maryland

```
5 REM BEGIN/BEND DEMO (BASIC 7.0)
10 A=0:B=1
15 PRINT"LINE 20 GIVES ";
20 IF A=1 THEN IF B=1 THEN PRINT "A=1,
   B=1":ELSE PRINT "A=1,B<>1"
25 PRINT"LINE 30 GIVES ";
30 IF A=1 THEN BEGIN:IF B=1 THEN
   PRINT "A=1,B=1":ELSE PRINT "A=1,
   B<>1":BEND
```

Use a cartridge expander: I frequently use the Simon's BASIC cartridge with my 64, but I often program in the original BASIC that comes with the computer. When I became worried about the effects of constant insertion and removal of the cartridge, I bought a cartridge expander with three slots, a selector switch and a reset button. Now all the wear and tear is on the sockets in the cartridge expander.
Frantz Parisot
Port-au-Prince, Haiti

Printer ruler: I've found a special ruler that's invaluable for use with a printer. It's 14 inches long, with four scales marked in inches, lines of text, 10-pitch characters and 12-pitch characters. I use it for layout work, for counting characters in listings, etc., and it's saved me lots of time and aggravation.

Made by the C-Thru Ruler Company, the model WP-101 is available for about $3 at many office supply stores.
Louis F. Sander
Pittsburgh, PA

LIST stopper: When working on a program, I often want its screen listing to stop at a particular point. Many times, for example, programs have large numbers of DATA statements at the end, and I'm working on the part of the program just before the DATA statements. I have no need to list the DATA statements, but I'm keenly interested in the code that appears before them.

I borrow a trick from the program protector's handbook, and use a REM (COMMODORE L) to stop the listing where I want it. When the computer encounters such a line, the listing terminates immediately, even though the program runs normally in every respect.
John Ettinger
Warren, Ohio

SX-64 keyboard repairs: If some of your SX-64 keys stop working, gently pry the top off the keyboard. Undo the screws to expose the keyboard connector, and look for one or two wires that seem to have slipped out of place. When you return them to their normal positions, you may have corrected the problem.
David Bradley
Address Unknown

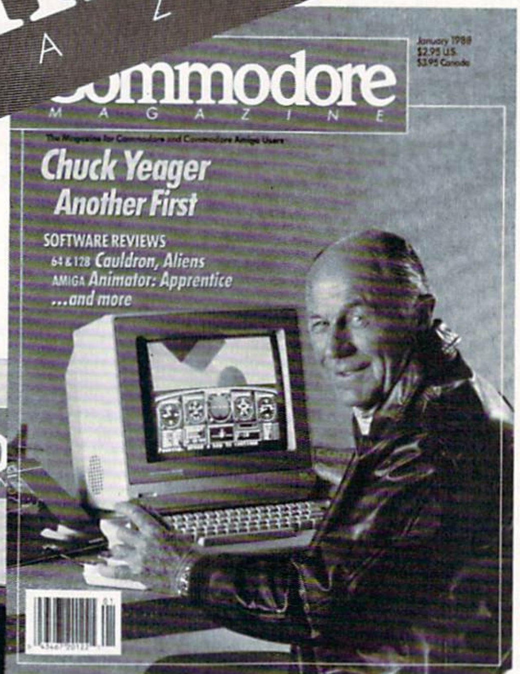
Keep two ribbons: Since printer ribbons quickly lose their like-new blackness, I always keep two of them on hand. One stays in the printer, and I keep it going until it's dry. The other, a like-new one, stays in my drawer until I need it for a high-quality printing job. I use it for that job only, then return it to the drawer until it's needed again. When the "everyday" ribbon finally wears out, I replace it with the moderately-worn ribbon from my drawer, and replace that ribbon with a brand-new one.
Luke A. Babey
Port Washington, NY

Program typing tip: Since I can never remember the keys used for some of the graphic symbols used in the type-in programs, I cut out the graphic symbol key found in the back of this magazine, and use it as my place marker while typing. It serves as a ready reference for symbols, and it can also be used as a bookmark!
Todd Moore
Address Unknown

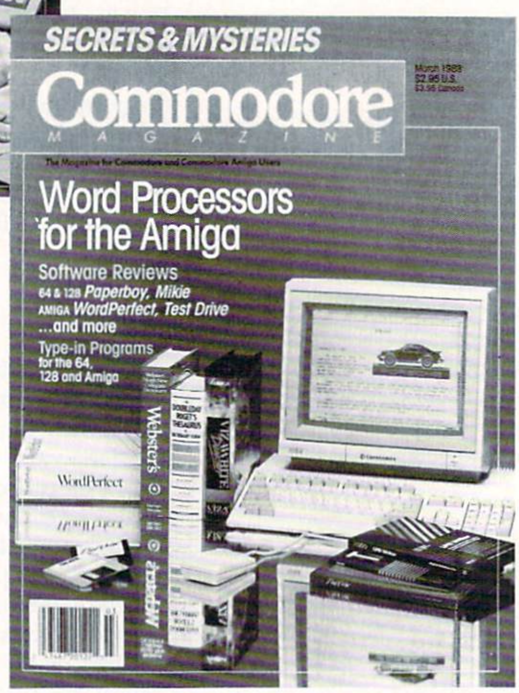
Program corrections: From time to time, every magazine prints corrections or improvements to programs it has previously published. Often they are in the form of letters to the editor. Whenever I see one of these, I find the original article and make a note of the correction right on the original pages, even if I haven't typed the program myself. Why? Because one day I might decide to type that program, and I don't want to miss the correction or improvement.

I make these corrections religiously, even if the original program didn't interest me. I never know if it will interest someone who borrows my magazine, and I do know that my own interests change greatly over time. In fact, when I dig out a back issue to transcribe one of these notes, I often find that the program it refers to is very much of interest, although it wasn't before. After all, the best programs inspire the most letters to the magazine.
Gregory Mead
Kent, OH

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manner that reflects far more than numbers of men and tanks.

Stalingrad Campaign also incorporates a strong sense of viewpoint by making players answerable to their own higher-ups—namely Hitler or Stalin. Historically, Hitler and, to a lesser degree, Stalin intervened constantly in their generals' planning. In the game, these two figures will not only issue directives to their respective Chiefs of Staff (i.e., the players) about objectives to be pursued, but will also countermand orders which they feel run contrary to the prescribed goals. Your supreme commander's opinion about the quality of your performance has a direct bearing on victory points; thus, when making a decision, you must consider the dictates of the situation in the field, as well as how well your orders will sit with Moscow or Berlin.

Much less successfully treated is the subject of limited intelligence. The game seems to err in the direction of being overly stingy with the amount of information it makes available to players. Combat reports are very sketchy: other than providing the level of casualties your units have suffered, they give no indication as to how the battle is progressing. As a result, you are forced to devise your strategies while operating in a near complete intelligence vacuum. The overall effect strikes me as more artificial than realistic.

I also have some doubts about the logic of the restriction placed on the Germans in two of the game's four scenarios. In the Case Blau scenario which recreates the German summer offensive to capture Stalingrad, and again in the campaign scenario which encompasses the entire campaign from June 1942 through February 1943, the computer prohibits any German unit from entering the eastern half of Stalingrad. What makes this constraint both mystifying and frustrating is that 1) the rulebook offers no explanation as to the reason behind it, and 2) more seriously, securing Stalingrad is vital to German victory in these scenarios, according to the player notes in the rules. The German player can still win either scenario without gaining complete control of the city; a German victory is simply harder to attain.

Stalingrad Campaign's strong points are the intrinsic appeal of its subject, its fast-playing game system, and its clever representation of viewpoint. While these strengths do not totally atone for its flaws, they do make the weaknesses easier to bear. ■

Continued from page 46

The last event is a Key event. During playback of your show, the program is continuously looking to see whether any of the ten function keys have been pressed. You can therefore insert an instruction to move to a specified part of your show if a particular function key is pressed. For example, your script can contain four events, each displaying a graph of sales for a different year. You can then instruct the program to display one of the four graphs depending on which function key the viewer presses.

Finally, *TV*SHOW* supplies a time-saving utility program called Scriptmover. It will find all of the graphic and text files you specified in your script and copy them (along with the Player Program and script file) on a separate disk for easy playback. As with all graphic intensive programs, expanded memory is necessary; Zuma Group recommends at least 1MB. The program is not copy protected and can easily be installed on a hard disk drive. The 112-page manual is quite comprehensive but lacks any pictures or screen simulations. As partial compensation, the program disk contains an impressive video tutorial, created with *TV*SHOW*, of course.

I have found *TV*SHOW* quite easy and quick to use. There are, however, some features missing from *TV*SHOW* which are contained in similar programs. First, *TV*SHOW* cannot generate its own text. Any writing you wish to display must be generated by other graphics programs and displayed either as a screen or an object. Second, *TV*SHOW* does not support the playback of digitized sounds. Finally, its limited ability to interact with the viewer (function keys only) diminishes its use in the educational and point of sale environments where detection of the location of the mouse pointer on the screen is vital.

According to Zuma Group, however, these features were purposely omitted from the program to efficiently enable *TV*SHOW* to achieve its objective in the areas of presentation applications and video titling. As a final note, the Zuma Group has advised me that the Player program (contained on the disk) is freely distributable as long as you are not selling the disk containing the Player program.

Considering its price and ease of use, *TV*SHOW* is a cost-effective tool for professionals and hobbyists alike—one which goes a long way towards developing the full potential of the Amiga. ■

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geoWrite Workshop which contains geoWrite 2.0, the preferred word processor of GEOS users (you'll also need it to import non-GEOS text files created by other word processors). Unless you already own these programs, the combined price of all three brings the cost of desktop publishing with *geoPublish* close to $200. Granted, you get lots of power for that price, but if you purchase *geoPublish* thinking you have everything you need in one package, you will be disappointed.

Outrageous Pages is Electronic Arts' offering. It is a stand-alone package which uses six sides of three disks to store the main program, plus some special templates (certificates, calendars, letterheads, newsletters, etc.), fonts and artwork. The program can be activated using either the keyboard, joystick or mouse input (or a combination). It comes complete with 50 fonts and 80 pieces of art (it is compatible with art created for both *Newsroom* and *Print Shop*). Text can be justified right, center or left or centered inside a column. You can cause the text to flow around or within a graphic item. The Text Processor lets you input text directly or import files created by other word processors using the ASCII (SEQ) format.

A powerful zoom editor lets you adjust both graphics or text (pixel by pixel if you wish) and a flexible graphic editor lets you create or change artwork to your personal needs. If you can't find the exact font you need among the 50 included, the Typeface option lets you change an existing font to suit your needs or create an entirely new font from scratch.

The program's friendly print options support most of the popular printers on the market and let you print entire documents or selected areas from a page.

You can use the word processor of your choice and import the files you create into your publishing program, hassle free.

All in all, I found the program amazingly easy to use, and (like *geoPublish*) the results compare favorably with those on the bigger systems. The preview options and simple pull-down window selections are simple to use (once you understand what each means), and mistakes are easy to escape by using the program's "Oops" option.

At this writing, Timeworks' *Desktop Publisher* has yet to be released, but because I did get to see a pre-release version at the last Consumer Electronics Show, I'll mention it here. The program will include a full-featured word processor and graphic toolbox. Like the other publishing programs, text can be sized and pasted over

The thousands of commercial and public domain graphics in circulation give the 64 or 128 desktop publisher an almost inexhaustible source of artwork.

and over using different type styles until the text looks the way you want it. The program comes with a healthy selection of fonts and type sizes ranging from nine to 36 points and is able to import text files created with any word processor using true ASCII. From what I've seen, this one too will be a program capable of competing with the big boys. Like *Outrageous Pages* it doesn't require the user to own any other programs.

The program was originally slated to appear on the market last Christmas. When it didn't materialize, I gave Timeworks a call to find out why. Here's the good and bad news—competition. It seems that the power of *geoPublish* caught the programmers in Deerfield a little off guard. And rather than come to the market with a product which didn't surpass the competition, Timeworks' Vice President, Victor Schiller sent all his programmers back into seclusion to remap the program's code until he is satisfied that *Desktop Publisher* is as good as an eight-bit desktop publishing program can be. I hope by the time you read this we will all know how successful their efforts were.

Commodore 128 Software

Although there are no stand-alone publishing programs like those for the 64 marketed specifically for the 128, there are two which allow users to publish using a mixture of new and traditional techniques. Both take advantage of the 128's 80-column display.

The first program to come to the 128 market which included some desktop publishing features was Xetec's *Fontmaster 128*. (See the April 1988 issue of *Commodore Magazine* for a complete review.) As its name implies, this powerful word processor lets the user create documents with a multitude of fonts as well as foreign alphabets (including Greek, Russian, Korean and Hebrew). The program also includes a font creator with which you can design your own unique typefaces (providing you have the patience). While you can't lay out your entire document on screen, you can format and style your text and publish it with different column widths. The program even lets you include and print graphics with the text. And because this "word processor" includes a good spell checking utility, you should be able to create documents void of those embarrassing misspelled words which every retired English teacher seems to love to wave in front of an editor's face.

Once you've printed your text and graphics with this program, you can paste them on your page layout in the traditional manner. This is far from automated desktop publishing, but if you need to

Page layouts can be changed or completely redone time after time, with no production cost and little time lapse.

publish in a foreign language, this may be your best bet.

The 128 program which comes closest to qualifying as a desktop publishing program (plus it supports the 80-column display) is GEOS 128. Although it is not a dedicated desktop publishing program, it includes all the features required to create and lay out one-page documents. Larger documents are just as simple to create, but they will require more user input to keep page numbers consecutive and layout styles uniform.

Many users will find this program perfect for their needs. The display screen updates itself faster than any publishing program which works in 64 mode alone. Because it takes full advantage of expanded memory (up to 512K) and the fast 1571 and even faster 1581 disk drives, the pro-

gram is able to perform adequate smooth-scrolling action. But the program's biggest advantage is its ability to show pages using an 80-column display. If you are sure you'll only need desktop publishing power occasionally, this might be your best buy. When used with Berkeley's latest word processor, *geoWrite 128*, this budget-priced package will have your expensive-computer user friends crying into their checkbooks.

Which program is most suitable for your needs is a personal decision. If you are already a GEOS owner, then continuing with the Berkeley line would be sensible. But all the programs have both comparable and unique features, and each is backed by a company with a proven support and track record. If you will be doing a lot of publishing, stay with one of the three 64 programs, but if you only need to set type or occasionally need to publish, you may like either of the 128 programs. Their main advantages are the 80-column screen display, more on-board memory and the ability to use the faster 1571 disk drive.

Accessories

As always, there are accessories which you may want to add to your publishing setup. My first add-on was a 1351 mouse. When it comes to productivity software, I've never been a great lover of the mouse or joystick as an input device—I prefer to keep my fingers firmly on the keyboard. But for moving and editing text/graphics within a desktop publishing program, nothing beats the mouse. As an alternative, I suggest SunCom's keyboard-mounted joystick called IconTroller. Because it mounts on the computer, you'll never have to remove both hands from the keyboard to move a block of text or change a graphic.

The only time you'll be aware of the limitations of using desktop publishing programs on either the 64 or 128 is when you try to move from one screen display to another. Because the memory of both computers is limited (when compared with systems with megabytes of free memory), the program must save the current display to disk and then recall (or create) the area you want to move to. You can add some speed into both the 64 or 128 by adding a RAM expansion unit. The 1764 (256K) and 1750 (512K) RAM expansion units add internal memory which can be accessed by the new publishing programs.

If you want to put photographs or more traditional artwork (paintings, charcoal sketches, etc.) on the pages you create, you'll need some way of capturing them in a form the computer can handle. The logical solution is an image digitizer like Digital Vision's *Computereyes*. Using a video camera, this product can scan and capture (digitize) almost anything and store it in a form which can be incorporated on a page. This is routinely done through a second graphic utility program like *Doodle!*, *Flexidraw* or *Print Shop*. You just digitize the image and save it in a format compatible with the graphic program you normally use. Then using that graphic program's editing tools you can size or change the image to suit your needs and save it again.

> An alternative solution to buying an expensive laser printer is to hire a commercial print shop to output the pages for you.

Finally, you can import the graphic into your publishing program. In some cases you may need another program to translate the images created with one graphic program into a format compatible with the publishing program you are using (for more information, see the January 1988 review of CDA's *Graphics Transformer*). Don't be put off by that quick and perhaps intimidating explanation. As is the case with most computer chores, after you've done it once, repeating the task is simple, regardless of how formidable it may have seemed when you read the instructions.

The more traditional way of adding images (not created by a computer) to a page for publication is to create the page and leave an empty block where the artwork/photograph is to go. Then paste the sized, original artwork directly on the page before publishing. In many cases, to achieve professional results, photographs will need to be screened first. This means the photograph is rephotographed through a special screen which converts the image into tiny dots (look closely at any photograph in this magazine for an example), which can be easily and accurately reproduced by a printing press. Most commercial printing shops and even some newspapers will screen and size your artwork for a small charge (perhaps one or two dollars per image).

If you aren't happy with the font selection which comes with your desktop publishing program, shop around. Both Berkeley Softworks and CDA (Complete Data Automation) offer font disks at a reasonable price. When selecting a font, the two important features to look for are clarity and readability. Ornamental typefaces may be eye catching, but if they are hard to read, your audience will reject your publication. The best typeface is one which is easy to read, yet conveys the essence of the document—serious, humorous, religious, academic or whatever.

The most exciting element of good desktop publishing is the professional results anyone can accomplish. When done right, your audience won't be able to distinguish your publications from those printed on million-dollar printing presses. In fact, most newspapers use a graphic creator (computer generator) similar to those included in desktop publishing programs and a laser printer to create many of the graphics you see every day.

To produce a commercial-quality publication you have to control quality throughout the creation and publishing process. It's okay to use less than perfect paper or a printer ribbon when you are learning and testing your equipment. Experimenting with conflicting text fonts or unbalanced layout is fine while you are learning. But as soon as you are ready to produce a document you will distribute or market, don't settle for less than perfection. You shouldn't allow anything less than your best into your publication. Make sure your planning, layout, graphics, grammar, paper, ink and reproduction are as good as you can make them. When you are tired, feel unappreciated or rushed, it's easy to settle for "good enough," but remember—once your work is printed you can't change it, and every eye will be judging you as well as your publication. We all make mistakes, the key to success is to make sure those mistakes are corrected before your audience sees them.

About Printers

The remaining obstacle in the way of many who want to publish professional-quality work is the printer. As good as matrix printers are, they can't create the solid images of a commercial typesetting machine. To squeeze true typesetting quality out of any publishing program (regardless of the system) you need a printer that can duplicate the graphics and text—perfectly. To achieve those professional results

usually requires a laser printer. Unfortunately, laser printers are expensive and beyond the reach of most individuals. While you may be able to get a good matrix printer for as little as $200, the least expensive laser will set you back nearly ten times that amount. But prices are dropping.

An alternative solution to buying this expensive equipment is to hire a commercial print shop to output the pages for you. This means you create the pages on disk, then take the disk to a commercial printer who (for a small fee) prints your pages on a laser printer. Users of GEOS who subscribe to Q-Link have another option. They can upload their finished pages to the GEOS Forum on Q-Link, where they will be printed on a laser printer and returned to them via overnight mail.

Improving Hard Copy

Rather than sell the family car to finance a laser printer, there are some things you can try which will improve the quality of your matrix printer's output. Most printers support some sort of NLQ (near letter quality) mode. If yours has such a mode, you'll want to use it when you are ready to print your finished document. When this mode is selected, the printer will print each line of graphic/text twice—once normally, and then the printer will rearrange the print head's pin assignment and print the line again to fill in the gaps left between the dots on the first pass. The resulting images come close to letter perfect. Because the NLQ mode on any printer requires each line to be printed at least twice, publishing time will increase too. Because I'm always in a hurry, I edit and design from a fast draft mode and use the NLQ mode only when I'm sure all changes and corrections have been made.

Another easy way to improve the final printing is to put a new ribbon in the printer—the darker the printout the better. Always use a good grade of smooth, solid white paper for the master draft. Any imperfections or texture in the paper will be duplicated when you publish it. Commercial publications make their master drafts on enameled paper. It is perfectly smooth and snow white, and its hard surface prevents the ink from spreading. If you are serious about publishing, find a source for enameled paper.

Once you have your master draft ready, you'll need to duplicate it. That means a trip to the copy machine or a commercial print shop. Regardless of which way you go, you can improve the appearance of your final document by reducing the size. Even a 10% reduction in size will make the graphics and text appear tighter and more professional—just make sure the text size is still readable.

Success

Publishing with a desktop program reduces the time, cost and delays involved using older publishing methods, but it can not magically turn anyone into a publishing baron. To successfully create a professional-quality document requires planning and skill. Just because you can mix text, fonts and graphics on a page doesn't mean the results will be pleasing. A successful document requires well-written, interesting, grammatically correct text printed with eye-pleasing but easy to read type styles, mixed with well-balanced, informative graphics. Too often, people approach desktop publishing with the idea that the more graphics they cram on a page and the more type styles they mix, the more appealing the final document will be. More often than not the result of such a haphazard approach is a confusing, crude, sophomoric publication.

Before you position the first pixel on a page, you should spend some time planning how the final display will look. Because changes are so simple to manage using a computer, you can sketch several rough layouts and compare them on the computer's screen without having to waste any resources. The screen display will show every dot and every line the printer will create when publishing time comes. Because nothing is final until you decide it is, you can resize, reshape, reformat, move, delete, redraw or reword every detail in your document on the screen (using magnified or overall views) until you are satisfied with the content and the layout.

Good layout is an art form. The "grey boxes" created by blocks of text should visually balance the bold images of graphics or photographs on your page. Any editor will tell you that a publication's type style is selected for its readability as well as the visual statement it makes. There are hundreds of fonts to chose from, and each was designed to convey a particular image. The font you use should match the topic. Using a bold typeface to attract attention is fine, but if your document is designed to convey the seriousness of a business venture a more formal, understated font selection would be appropriate. Don't despair—all the current desktop publishing programs make selecting just the right font easy. In the old days of publishing you were never sure how the final document

Products mentioned in this article include:

geoPublish $69.95
GEOS $59.95
GEOS 128 $69.95
DeskPack 1 $34.95
geoWrite Workshop $49.95
geoWrite Workshop 128 $69.95
Publisher: Berkeley Softworks
2150 Shattuck Ave.
Berkeley, CA 94704
(415) 644-0883

Outrageous Pages $49.95
Publisher: Batteries Included
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
(415) 571-7171

Desktop Publisher $49.95
Publisher: Timeworks, Inc.
444 Lake Cook Rd.
Deerfield, IL 60015
(312) 948-9200

Newsroom $49.95
Publisher: Springboard Software
7808 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3915

Fontmaster 128 $69.95
Publisher: Xetec, Inc.
2804 Arnold Rd.
Salina, KS 67401
(913) 827-0685

Computereyes $129.95
Manufacturer: Digital Vision
66 Eastern Ave.
Dedham, MA 02026
(617) 444-9040

The Graphics Transformer $34.95
Publisher: CDA, Inc.
561 N. Main St.
Yreka, CA 96097
(916) 842-3431

IconTroller $19.95
Manufacturer: Suncom
260 Holbrook Dr.
Wheeling, IL 60090
(312) 459-8000

would appear until the type had been set and a proof of the page produced (a slow and costly method). But reformatting and testing different fonts is simple with a computer. If you set a block of text with one font and decide it just doesn't convey the right feeling, is the wrong size, or isn't as readable as you would like, changing it is as simple as loading another font into the document and having all the text automatically changed. You can do this as often as you like until the document has just the right feel and appearance.

Like any new task, the more you use a desktop publishing program, the easier it becomes, and the better the results will be. Examples of good page layout are all around us. If you are unhappy with your first results or simply want to improve, I recommend you attempt to duplicate documents you admire using the desktop publishing program you buy. First, try to duplicate the cover of your favorite magazine or newspaper—then try to improve on the layout. One of my favorite references for inspiration is the *Art Director's Annual First Time Winners*. It contains the very best page displays for editorial, advertising and television use each year. Every page of the book is filled with examples of successful page layout. In the past the book has been published by Watson-Guptill and should be available at any well-stocked public library.

It is ironic that the one medium which was supposed to kill the paper and publishing industry—computers—is the engine which is driving those industries today. When computers first became affordable and fashionable, many in the industry predicted that all correspondence would be done via modems and that filing cabinets would be replaced with floppy disk cases. Instead the computer has increased the use of paper. The consumer has once again established the market by personal demand. No matter how fond we become of staring at phosphorous tubes and on-screen graphics, nothing replaces the convenience of being able to take the same information stored on paper with us wherever we go.

The insurmountable allure of the new eight-bit desktop publishing programs is that they are affordable. Yet, even at these bargain prices, they offer quality and power to spare, plus they're surprisingly easy to understand and use. This may be remembered as the year the personal computer delivered the ability to exercise the right to freedom of the press on everyone's doorstep.

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keys or single keys that represent the icons. How much simpler could it get?

If you think this simple game system isn't enough to capture your attention, then you must see and hear the world at Galaxy's End. You can't help being impressed after playing *2199 A.D.* for a few minutes. The game is played on what appears to be a space ship of some sort. You move through chambers and doors that are in the form of a maze from a first person perspective in the maze, not unlike *Bard's Tale*. The difference is that the graphics roll by smoothly with the Amiga's power behind them so that you don't take incremental steps from one block of the maze to another, but rather scroll forward until you've moved a few feet or hit a wall. Along the way through a room, which you see most of from your entrance into it, you might meet a character (hostile or friendly) or find an object that you can use later.

The rooms are small and complex in design in that you see one or more doors, but they are not the only exits from the room. Sometimes when you pass through a door, if you turn around, you only see a wall where you entered the room. These one-way doors/walls can be entered from both directions. The key to exploring the space ship and finding Kurtz is discovering all the exits from a room, thus giving a more detailed picture of your surroundings. As a general rule, if there is a wall that may be passed through in a room, the color of that wall is a shade darker than the characteristic color of the room.

When first starting *2199 A.D.*, there are three things that you must do: obtain a weapon of some kind, meet some characters and discover their purpose and learn how to map out the space ship. Mapping is a disputable subject with *2199 A.D.* If the rooms were depicted differently instead of just having bare walls, ceilings and floors, mapping would not be necessary. But because this is not true and because there is only a small selection of colors used for the walls, mapping is a must. It will keep you sane and reveal blank spaces where there may be a room.

Dealing with characters is another important part of *2199 A.D.* There are two types of encounters that you will have: friendly and hostile. Some aliens will attack you when you walk in the room; others will wait until you anger them. In any case, the figures that pop up on the screen are the most beautiful and detailed I have seen in a while. You will encounter many, many different faces in *2199 A.D.*; some of those you'll meet on the first level are: Tristar the mechanic, a very stout miner, Mangle Tangle, Speedy Gonzales and Dr. Fever the robot.

The first thing you should do is use the Examine icon to look at the character in more detail. This action will reveal a little bit about the alien. This info may hint at the character's purpose. Then you should use the Say icon to try to elicit responses from the alien. The character responds using the Amiga voice and will either explain that it doesn't understand what you said or say something useful.

You have to be very careful about what you say and do around the characters in *2199 A.D.* Character interaction is very important in the continued success of your quest. In fact (here comes a hint), you don't know that you can get a weapon at the beginning of the game unless you talk to Dr. Fever. He tells you that Mangle Tangle has weapons, and Mangle Tangle sends you in search of something in trade for a knife. Talking to these two characters offers hope of defense. If you're not careful with your actions, you'll wind up in combat—a relatively simplistic version of a fight. Both you and your enemy's outlines appear on the screen with hit point count and different areas of the outlines lit up to reveal a hit. Your choices are fight, panic and dodge, and the battle ends quickly. Until you have a weapon, avoid all fights.

Along with the use of speech and graphics, *2199 A.D.* makes incredible sounds come from your Amiga's speaker. Digitized sound effects and music are used constantly throughout the game, with background music changing every couple of minutes to avoid boredom. Windows are also essential to the *Alien Fires* system. This brings us back to Jagware's initial claim that they would use the great potential of the Amiga in the game—it is evident that the designers have practiced what they preached.

The only complaint I have with *2199 A.D.* is the method of saving games. Choosing the sleep icon saves the game, but you have to reboot the system to continue play. Even though the TimeLord Elders give you a few chances at continuing play after death, Jagware should redesign the save game utility. Aside from this, *Alien Fires, 2199 A.D.* may just be the nicest looking, best sounding and easiest playing role-playing game currently available for the Amiga. I can't wait for the sequel!

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the Multivoltmeter (which also reads resistance), and the Multiscope that operates like a regular oscilloscope.

Jermaine: Can you give me some information about the software that comes with the Workshop?

Carver: Kevin Homer (the creator of the Mach 5 and 128 cartridges) wrote the majority of the code for the Robotic Workshop software package. The Robotic Operating System (or ROS for short) contains 25 additional commands but occupies only 4K of memory. Even though ROS resembles the standard 64 operating system, it can be altered to take readings at a much faster rate of speed. The workshop's MASTER command expands the capabilities even further. If a guy wants to do some highly sophisticated timing, for example, he can shut down everything else and use just the timer at a precise level of operation. With MASTER, I can set up an infrared sensor to start a motor or turn on an alarm after 10,333,021 people have passed a given point. After the final person walks by, the condition is met, and the external device activates within one millisecond. MASTER also allows me to record the speed of moving objects in this test situation, while providing a limited form of multitasking. The computer actually does several things simultaneously, even though the user won't be aware of the fact. If you think MASTER has a lot of interesting possibilities, there are seven other advanced commands on the disk.

At one time, we had considered developing software packages in other languages like Forth, C, Logo, etc. We were looking at these particular languages because Forth is commonly used by industrial robotic programmers, C is pretty popular, and Logo has a large loyal following in school systems across the country. Unfortunately, there hasn't been enough customer interest to warrant the expense of writing that material.

Witzel: We made the decision to write the program as 6502 machine code (which would interact with and add to BASIC language) because most home computer owners know enough about BASIC to use our software.

To illustrate my point, I'd like to show you how easy it is to manipulate a motor with the Commodore 64. To turn a motor on, type in "MOTR", give it a number (you can run three motors at any given time with the workshop), add a comma, and assign a speed to the motor. A finished sample formula reads: MOTR1,30. This command can also be issued by replacing the numbers with variables. That would read: MOTRX,Y. In fact, many tasks can be performed two or three different ways with existing commands, and most BASIC programs can be easily adapted to work with our software.

Jermaine: What expansion modules are currently in the works?

Witzel: There are many devices we've seriously looked at as possible add-ons for the Robotic Workshop. Several of these items are centered around the oscilloscope function of the package. One possible kit will contain a special temperature probe. This instrument allows the user to plot a large number of temperature readings over a five to six hour period.

> If you like to do serious tinkering, the Workshop is good for hours of stimulating educational fun.

Our people are also working on an advanced speech module kit. Even though we don't have editing capabilities yet, the unit will eventually record digitized sounds and play them back through the SID chip of your home computer (without the aid of the module).

The most promising item on the drawing board is our liquid crystal module. Liquid crystal is a common display technology used in LCD watches, portable televisions, certain types of 3D glasses, etc. If everything goes according to plan, this package will appear on the market before the end of 1989, and it will probably have projects explaining the principles of the items mentioned above.

Carver: In recent months, Steve and I have seriously studied the science of radio control. This principle looked interesting at first, but a series of problems materialized when we tried to put it into kit form. I recently discovered that infrared technology could perform the same type of tasks we wanted to accomplish with radio control. I'm sure this new information will inspire us to put together another module package in the near future.

Jermaine: We've talked about your Robotic Workshop ideas, but what is the public doing with the package?

Witzel: Before I discuss what other people are doing with our product, I want to tell you about several things we're doing with the workshop in-house. Since the kit contains an accurate voltage meter, Bruce and I decided to make it work for us in the Multibotic assembly area. We're now testing interfaces (coming off the assembly line) with a Commodore 64 computer, several relays, and one of our own B100 interfaces. The newly assembled interfaces go through a series of tests, under specific conditions, where we know a certain voltage exists at key points in the design. Since we're dealing with a programmable voltmeter (that's also programmable in BASIC), it was easy to write software that tells the computer to test the voltage level at a given location and move on to other points by manipulating the relays connected to it. Everything is done automatically.

This testing procedure worked out so well that we've secretly incorporated that same technology into the designs of the Mach 5 and 128 cartridges. Whenever you insert one of these cartridges into your computer and power up, it pauses momentarily to test its own circuitry.

In recent months, Bruce and I connected the B100 interface unit to a special machine that had once been an automatic paper cutter. We used this machinery to measure and cut a six foot piece of wire and two pieces of plastic tubing for the Lipstik (our voice-activated control headset used in *Echelon*). The infrared sensors count links on a chain. When they reach the desired length, the cutter is activated. This little operation saved us a lot of trouble and does the work of seven employees.

Getting back to your original question, it's hard to remember specific letters (from Robotic Workshop users) because we receive hundreds of responses every week. NASA engineers recently purchased several of our units. We'd like to know what they're doing with them. Many HAM radio operators have written about utilizing the Robotic Workshop to control the positioning of their antennas. A company in California is also using our B100 interface to create and control lighting effects in movies. They use the unit to set up a sequence of events, with each incident having a pre-determined duration period. Another owner of the Robotic Workshop is experimenting with a unique idea in his own home. He wants to monitor and regulate the moisture of his lawn with our product. This clever individual is developing a system of moisture probes which will eventually activate sprinklers (in different areas of his lawn) whenever they are needed.

Carver: I recently read a letter from a consumer using the workshop to measure camera shutter speeds. He wants us to

help him create a command, similar to SDUR, that would allow him to measure the time that the infrared beam is not interrupted. We're currently working on solving his problem.

Another person owns and operates a cable computer channel, with downloading capabilities, a news service, etc. He's looking at the possibility of interfacing our advanced speech system within his system. If everything works out, this company will offer their Commodore 64 customers the first talking computer news service I've heard of to date.

As I stated earlier, I'm also very interested in the educational aspect of our product. Many school systems have recently purchased the Multibotic workshop, but a larger number of teachers are paying for the units out of their own pockets. Several school districts have even expressed an interest in developing lesson plans around our products.

One final note of interest: The Boston Museum of Science has plans to incorporate a Robotic Workshop into one of their traveling exhibitions. The list goes on . . .

Jermaine: In the previous answer, you mentioned the Lipstik headset. Can you give me some information about that unusual piece of equipment?

Witzel: *Echelon*, for those of you not familiar with the program, is a 3D space flight simulator. During July of 1987, the *Echelon* project was approximately 50% completed. About that time, Bruce Carver came to me with an interesting problem: they needed an extra fire button for the program. The keyboard was out of the question, because they didn't want the player to take his eyes off the screen.

I looked over the situation and came up with several possible solutions. Tape switches could easily be attached to a joystick and foot pedals were practical, but their price tags prohibited us from using them. Some of the foot switches we looked at initially seemed to solve our problem. Unfortunately, these devices tend to work better on certain types of carpeting.

While we were experimenting with infrared technology (where you'd wave your hand over something to trigger a response), I came up with the idea of building a unit that was activated by sound. We quickly constructed some voice operated prototypes and tried them out on *Beachhead* and *Beachhead II*. Everyone at Access enjoyed the Lipstik so much that we soon decided to develop Lipstik Plus, a voice activated headset which could be used with other programs. By the way, James Slade and Bruce Carver contributed a lot to the Lipstik design.

Jermaine: From the beginning of this interview, we've brought up the word "robotics" in the conversation. Do you expect to market a robot construction set in the near future?

Witzel: That's an interesting question. We will eventually release some robotic-looking modules (like a robotic arm) for the workshop, but we're presently perfecting more fundamental robotic applications. The majority of our mail demands it. When you're talking about robotics, another issue enters the picture. A decent robot construction kit could cost you a thousand dollars or more. We believe the average consumer would rather spend his hard-earned money on testing equipment, an advanced sound reproduction module, or even a robotic arm if the price is right. I wish we could market an advanced robot construction package sometime in the future, but it would be too expensive for most of our followers.

Jermaine: Wrapping things up, do you have some final comments about the Robotic Workshop in general?

Carver: I've always thought of myself as several different people occupying the same body. The challenge of being a game designer/programmer is enjoyable and I like being the president of Access Software, but somehow my career has always lacked something. Multibotics has fulfilled that need by allowing me to help children and adults understand technology we all take for granted. The workshop has also given me the opportunity to work with well-known educators and creative individuals from every corner of the country. As far as I'm concerned, the Robotic Workshop is just the first step in a great adventure. The rest is up to you.

Witzel: Even though I'm just a grey haired old man *[he says with a laugh]*, I can still contribute something useful to the field of education. My prime goal at Multibotics is to get people to take a serious look at our product. It has a lot of potential, it's not just a toy, and the package is a base unit for the more advanced modules currently under development. If you like to do serious tinkering (like Bruce and I do) the workshop is good for hours of stimulating educational fun. I don't normally take a cheap shot at Bruce, but the Robotic Workshop is merely a "Beach head" in the fascinating world of electronics.

Multibotics at Kent State

Now that you've read about the Robotic Workshop and how it came into being, let's find out what a well-known educator thinks of the product. Dr. Terry J. Squier is the Coordinator of the School of Technology at Kent State University.

Dr. Squier: The Robotic Workshop, MB230, provides a new and exciting adventure into the world of robotics, computers, electricity, engineering and science. There is no better way to learn about and understand how computers are used to expand human capabilities than to actually set up and perform your own computer-controlled activities. The experiments found in the Robotic Workshop become real life as you design your own cruise control for a car or program a robot to perform basic functions.

The product has been field tested in elementary, secondary and post-secondary settings with remarkable results. While the Workshop can be used to demonstrate basic scientific and technological applications of computer-controlled devices to the elementary student, the intermediate and advanced learners will find the unit to be an exciting and challenging medium to apply and test their knowledge of computers, machine controls and feedback, science, engineering and applications of hardware. The elementary students completed the beginning units with little assistance or pre-instruction. The secondary students were properly challenged to apply their problem-solving and creative abilities with enthusiasm as they developed technological and computer literacy.

In conclusion, the Robotic Workshop can provide an exciting activity to interface a computer with motors, gears, infrared sensors, sound, light, and robotics. Most students will be able to perform the fifty-plus activities with very little help.

It is time to turn our philosophical discussions into action. We must accomplish this by developing a technology laboratory where students can experiment with the technological innovations of our modern world. As far as I'm concerned, the Workshop takes care of that need.

Jermaine: As I finish this assignment, I'd like to add my own observations about the Robotic Workshop. I've used the Workshop for several months, and I'm really having a lot of fun with it. Bruce and Steve are right. Once you get your feet wet, the product is very addictive. The projects are well worded, interesting, and give the user valuable information about every subject that is covered. I recommend the Robotic Workshop to anyone with a yen to learn and the desire to do something constructive with their home computer. C

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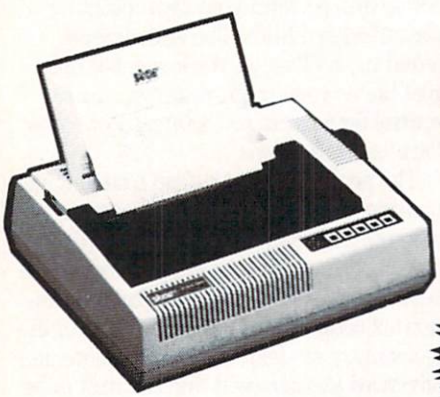
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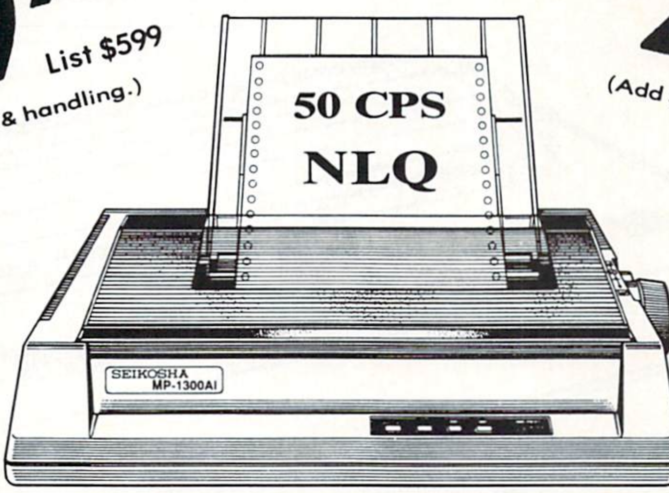
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The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN, RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice. Note: Do not enter the commas.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

SYNTAX ERROR

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270", type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parenthesis. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the "wrong" line to look at. If the line the syntax error refers to has a function call (i.e., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

ILLEGAL QUANTITY ERROR

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

OUT OF DATA ERROR

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

OTHER PROBLEMS

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than 80 (or 88) characters on one line. You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are on pages 133-134 of the VIC 20 user guide and 130-131 of the Commodore 64 user's guide.

If you type a line that is longer than 80 (or 88) characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed (without a line number). Many people write that the computer gives them a syntax error when they type the line, or that the computer refuses to accept a line. Both of these problems are results of typing a line of more than 80 (or 88) characters.

"[HOME]" = UNSHIFTED CLR/ HOME
"[CLEAR]" = SHIFTED CLR/HOME
"[DOWN]" = CURSOR DOWN
"[UP]" = CURSOR UP
"[RIGHT]" = CURSOR RIGHT
"[LEFT]" = CURSOR LEFT
"[RVS]" = CONTROL 9
"[RVOFF]" = CONTROL 0
"[BLACK]" = CONTROL 1
"[WHITE]" = CONTROL 2
"[RED]" = CONTROL 3
"[CYAN]" = CONTROL 4
"[PURPLE]" = CONTROL 5
"[GREEN]" = CONTROL 6
"[BLUE]" = CONTROL 7
"[YELLOW]" = CONTROL 8
"[ORANGE]" = COMMODORE 1
"[BROWN]" = COMMODORE 2
"[L. RED]" = COMMODORE 3
"[GRAY1]" = COMMODORE 4
"[GRAY2]" = COMMODORE 5
"[L. GREEN]" = COMMODORE 6
"[L. BLUE]" = COMMODORE 7
"[GRAY3]" = COMMODORE 8
"[F1]" = F1
"[F2]" = F2
"[F3]" = F3
"[F4]" = F4
"[F5]" = F5
"[F6]" = F6
"[F7]" = F7
"[F8]" = F8
"[POUND]" = ENGLISH POUND
"[SHFT ^]" = PI SYMBOL
"[^]" = UP ARROW

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

THE PROGRAM WON'T RUN!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is "running". Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

IF ALL ELSE FAILS

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program. The user group may also have the program on a library disk and be willing to make a copy for you.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase you understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing (if possible)

All of this information is helpful in answering your questions about why a program doesn't work. A letter that simply states "I get an error in line 250 whenever I run the program" doesn't give us much to go on. Send your questions to:

Commodore Magazine
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

Have fun with the programs!

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

The Magazine Entry Programs on the next pages are two BASIC machine language programs that will assist you in entering the programs in this magazine correctly. There are versions for both the Commodore 64 and the Commodore 128. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 49900 (4864-5545 on the 128) and just lets you know that the program is running. If everything is ok, the program will finish running and say DONE. Then type NEW. If there is a problem with the data statements, the program will tell you where to find the problem. Otherwise the program will say "mistake in data statements." Check to see if commas are missing, or if you have used periods instead of commas. Also check the individual data items.

Once the program has run, it is in memory ready to go. To activate the program type SYS49152 (SYS4864 on the 128), and press RETURN. You are now ready to enter the programs from the magazine. To disable the Entry Program, just type KILL [RETURN] on the 64 or SYS4867 on the 128.

The checksums for each line are the same for both the 64 and 128, so you can enter your 64 programs on the 128 if you'd like.

Typing the Programs

All the BASIC program listings in this magazine that are for the 64 or 128 have an apostrophe followed by four letters at the end of the line (e.g., 'ACDF). If you plan to use the Magazine Entry Program to enter your programs, the apostrophe and letters **should** be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it **does not** enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are five error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT . .) incorrectly. Check the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

The Magazine Entry Programs are available on disk, along with other programs in this magazine, for $9.95. To order, contact Loadstar at 1-800-831-2694.

```
10 PRINT"[CLEAR]POKING -";
20 P=49152 :REM $C000  (END AT
   49900/$C2EC)
30 READ A$:IF A$="END"THEN 110
40 L=ASC(MID$(A$,2,1))
50 H=ASC(MID$(A$,1,1))
60 L=L-48:IF L>9 THEN L=L-7
70 H=H-48:IF H>9 THEN H=H-7
80 PRINT"[HOME,RIGHT12]"P;
90 IF H>15 OR L>15 THEN PRINT
   :PRINT"DATA ERROR IN LINE";
   1000+INT((P-49152)/8):STOP
100 B=H*16+L:POKE P,B:T=T+B:P=P+1
   :GOTO 30
110 IF T<>86200 THEN PRINT
   :PRINT"MISTAKE IN DATA --> CHECK
   DATA STATEMENTS":END
120 PRINT"DONE":END
1000 DATA 4C,1F,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,0D,00,21
1002 DATA C1,27,C1,2F,C1,3F,C1,4C
1003 DATA C1,EA,EA,EA,4C,54,C0,A2
1004 DATA 05,BD,19,C0,95,73,CA,10
1005 DATA F8,60,60,A0,03,B9,00,02
1006 DATA D9,04,C1,D0,F5,88,10,F5
1007 DATA A0,05,B9,A2,E3,99,73,00
1008 DATA 88,10,F7,A9,00,8D,18,D4
1009 DATA 4C,EF,C0,E6,7A,D0,02,E6
1010 DATA 7B,4C,79,00,A5,9D,F0,F3
1011 DATA A5,7A,C9,FF,D0,ED,A5,7B
1012 DATA C9,01,D0,E7,20,2B,C0,AD
1013 DATA 00,02,20,74,C0,90,DC,A0
1014 DATA 00,4C,A9,C1,C9,30,30,06
1015 DATA C9,3A,10,02,38,60,18,60
1016 DATA C8,B1,7A,C9,20,D0,03,C8
1017 DATA D0,F7,B1,7A,60,18,C8,B1
1018 DATA 7A,F0,37,C9,22,F0,F5,6D
1019 DATA 03,C0,8D,03,C0,AD,04,C0
1020 DATA 69,00,8D,04,C0,4C,8E,C0
1021 DATA 18,6D,05,C0,8D,05,C0,90
1022 DATA 03,EE,06,C0,EE,09,C0,4C
1023 DATA CE,C1,18,6D,08,C0,8D,08
1024 DATA C0,90,03,EE,07,C0,EE,0A
1025 DATA C0,60,0A,A8,B9,0F,C0,85
1026 DATA FB,B9,10,C0,85,FC,A0,00
1027 DATA A9,12,20,D2,FF,B1,FB,F0
1028 DATA 06,20,D2,FF,C8,D0,F6,20
1029 DATA BC,C2,20,E4,FF,F0,FB,A0
1030 DATA 18,B9,08,C1,20,D2,FF,88
1031 DATA 10,F7,68,68,A9,00,8D,00
1032 DATA 02,4C,74,A4,4B,49,4C,4C
1033 DATA 91,91,0D,20,20,20,20,20
1034 DATA 20,20,20,20,20,20,20,20
1035 DATA 20,20,20,20,20,20,20,91
1036 DATA 0D,51,55,4F,54,45,00,4B
1037 DATA 45,59,57,4F,52,44,00,23
1038 DATA 20,4F,46,20,43,48,41,52
1039 DATA 41,43,54,45,52,53,00,55
1040 DATA 4E,49,44,45,4E,54,49,46
1041 DATA 49,45,44,00,4E,4F,20,43
1042 DATA 48,45,43,4B,53,55,4D,00
1043 DATA C8,B1,7A,D0,FB,84,FD,C0
1044 DATA 09,10,03,4C,84,C1,88,88
1045 DATA 88,88,88,B1,7A,C9,27,D0
1046 DATA 13,A9,00,91,7A,C8,A2,00
1047 DATA B1,7A,9D,3C,03,C8,E8,E0
1048 DATA 04,D0,F5,60,A9,04,4C,CA
1049 DATA C0,A0,00,B9,00,02,99,40
1050 DATA 03,F0,F0,C8,D0,F5,A0,00
1051 DATA B9,40,03,F0,E6,99,00,02
1052 DATA C8,D0,F5,20,96,C1,4C,12
1053 DATA C2,A0,09,A9,00,99,03,C0
1054 DATA 8D,3C,03,88,10,F7,A9,80
1055 DATA 85,02,A0,00,20,58,C1,20
1056 DATA 89,C1,20,ED,C1,E6,7A,E6
1057 DATA 7B,20,7C,A5,A0,00,20,80
1058 DATA C0,F0,D0,24,02,F0,06,4C
1059 DATA A8,C0,4C,CE,C1,C9,22,D0
1060 DATA 06,20,8D,C0,4C,CE,C1,20
1061 DATA BA,C0,4C,CE,C1,A0,00,B9
1062 DATA 00,02,20,74,C0,C8,90,0A
1063 DATA 18,6D,07,C0,8D,07,C0,4C
1064 DATA EF,C1,88,A2,00,B9,00,02
1065 DATA 9D,00,02,F0,04,E8,C8,D0
1066 DATA F4,60,18,AD,09,C0,69,41
1067 DATA 8D,09,C0,38,AD,0A,C0,E9
1068 DATA 19,90,06,8D,0A,C0,4C,1C
1069 DATA C2,AD,0A,C0,69,41,8D,0A
1070 DATA C0,AD,03,C0,6D,05,C0,48
1071 DATA AD,04,C0,6D,06,C0,8D,0C
1072 DATA C0,68,6D,08,C0,8D,0B,C0
1073 DATA AD,0C,C0,6D,07,C0,8D,0C
1074 DATA C0,38,E9,19,90,06,8D,0C
1075 DATA C0,4C,52,C2,AD,0C,C0,69
1076 DATA 41,8D,0C,C0,AD,0B,C0,E9
1077 DATA 19,90,06,8D,0B,C0,4C,67
1078 DATA C2,AD,0B,C0,69,41,8D,0B
1079 DATA C0,A0,01,AD,09,C0,CD,3C
1080 DATA 03,D0,20,C8,AD,0A,C0,CD
1081 DATA 3D,03,D0,17,C8,AD,0B,C0
1082 DATA CD,3E,03,D0,0E,AD,0C,C0
1083 DATA CD,3F,03,D0,06,20,CC,C2
1084 DATA 4C,4B,C0,98,48,68,4C,CA
1085 DATA C0,A9,20,8D,00,D4,8D,01
1086 DATA D4,A9,09,8D,05,D4,A9,0F
1087 DATA 8D,18,D4,60,20,A9,C2,A9
1088 DATA 81,20,DF,C2,A9,80,20,DF
1089 DATA C2,4C,D9,C2,20,A9,C2,A9
1090 DATA 11,20,DF,C2,A9,10,20,DF
1091 DATA C2,A9,00,8D,04,D4,60,8D
1092 DATA 04,D4,A2,70,A0,00,88,D0
1093 DATA FD,CA,D0,FA,60,END
```

END

```
5 TRAP 200
10 PRINT"[CLEAR]POKING -";
20 P=4864 :REM $1300  (END AT
   5545/$15A9)
30 READ A$:IF A$="END"THEN 110
80 PRINT"[HOME,RIGHT12]"P;
100 B=DEC(A$):POKE P,B:T=T+B:P=P+1
   :GOTO 30
110 IF T<>59382 THEN PRINT
   :PRINT"MISTAKE IN DATA --> CHECK
   DATA STATEMENTS":END
120 PRINT"DONE":END
200 PRINT:PRINT"DATA ERROR IN LINE";
   1000+INT((P-4864)/8):END
1000 DATA 4C,1E,13,4C,3A,13,00,00
1001 DATA 8E,00,F7,00,42,41,51,57
1002 DATA 0D,00,0D,43,08,14,0E,14
1003 DATA 16,14,26,14,33,14,A9,00
1004 DATA 8D,00,FF,AD,04,03,8D,12
1005 DATA 13,AD,05,03,8D,13,13,A2
1006 DATA 4A,A0,13,8E,04,03,8C,05
1007 DATA 03,60,AD,12,13,8D,04,03
1008 DATA AD,13,13,8D,05,03,60,6C
1009 DATA 12,13,A5,7F,D0,F9,AD,00
1010 DATA 02,20,5B,13,90,F1,A0,00
1011 DATA 4C,6F,14,C9,30,30,06,C9
1012 DATA 3A,10,02,38,60,18,60,C8
1013 DATA B1,3D,C9,20,D0,03,C8,D0
1014 DATA F7,B1,3D,60,18,C8,B1,3D
1015 DATA F0,35,C9,22,F0,F5,6D,06
1016 DATA 13,8D,06,13,AD,07,13,69
1017 DATA 00,8D,07,13,4C,75,13,18
1018 DATA 6D,08,13,8D,08,13,90,03
1019 DATA EE,09,13,EE,0C,13,60,18
1020 DATA 6D,0B,13,8D,0B,13,90,03
1021 DATA EE,0A,13,EE,0D,13,60,0A
1022 DATA A8,B9,14,13,85,FB,B9,15
1023 DATA 13,85,FC,A0,00,8C,00,FF
1024 DATA A9,12,20,D2,FF,B1,FB,F0
1025 DATA 06,20,D2,FF,C8,D0,F6,20
1026 DATA 79,15,20,A3,15,20,E4,FF
1027 DATA F0,FB,A0,1B,B9,EF,13,20
1028 DATA D2,FF,88,10,F7,68,68,A9
1029 DATA 00,8D,00,02,4C,B7,4D,91
1030 DATA 91,0D,20,20,20,20,20,20
1031 DATA 20,20,20,20,20,20,20,20
1032 DATA 20,20,20,20,20,20,91,0D
1033 DATA 51,55,4F,54,45,00,4B,45
1034 DATA 59,57,4F,52,44,00,23,20
1035 DATA 4F,46,20,43,48,41,52,41
1036 DATA 43,54,45,52,53,00,55,4E
1037 DATA 49,44,45,4E,54,49,46,49
1038 DATA 45,44,00,4E,4F,20,43,48
1039 DATA 45,43,4B,53,55,4D,00,C8
1040 DATA B1,3D,D0,FB,98,30,04,C9
1041 DATA 06,30,1E,88,88,88,88,88
1042 DATA B1,3D,C9,27,D0,13,A9,00
1043 DATA 91,3D,C8,A2,00,B1,3D,9D
1044 DATA 00,0B,C8,E8,E0,04,D0,F5
1045 DATA 60,4C,5C,15,4C,C5,14,A0
1046 DATA 09,A9,00,99,06,13,8D,00
1047 DATA 0B,88,10,F7,A9,80,85,FD
1048 DATA A0,00,20,3F,14,20,AE,14
1049 DATA 20,0D,43,84,FA,A0,FF,20
1050 DATA 67,13,F0,D8,24,FD,F0,06
1051 DATA 20,8F,13,4C,8F,14,C9,22
1052 DATA D0,06,20,74,13,4C,8F,14
1053 DATA 20,9F,13,4C,8F,14,A0,00
1054 DATA B9,00,02,20,5B,13,C8,90
1055 DATA 0A,18,6D,0A,13,8D,0A,13
1056 DATA 4C,B0,14,88,60,18,AD,0C
1057 DATA 13,69,41,8D,0C,13,38,AD
1058 DATA 0D,13,E9,19,90,06,8D,0D
1059 DATA 13,4C,CF,14,AD,0D,13,69
1060 DATA 41,8D,0D,13,AD,06,13,6D
1061 DATA 08,13,48,AD,07,13,6D,09
1062 DATA 13,8D,0F,13,68,6D,0B,13
1063 DATA 8D,0E,13,AD,0F,13,6D,0A
1064 DATA 13,8D,0F,13,38,E9,19,90
1065 DATA 06,8D,0F,13,4C,05,15,AD
1066 DATA 0F,13,69,41,8D,0F,13,AD
1067 DATA 0E,13,E9,19,90,06,8D,0E
1068 DATA 13,4C,1A,15,AD,0E,13,69
1069 DATA 41,8D,0E,13,A0,01,AD,0C
1070 DATA 13,CD,00,0B,D0,20,C8,AD
1071 DATA 0D,13,CD,01,0B,D0,17,C8
1072 DATA AD,0E,13,CD,02,0B,D0,0E
1073 DATA AD,0F,13,CD,03,0B,D0,06
1074 DATA 20,89,15,A4,FA,60,98,48
1075 DATA 68,4C,AF,13,A9,04,4C,AF
1076 DATA 13,A9,00,8D,00,FF,A9,20
1077 DATA 8D,00,D4,8D,01,D4,A9,09
1078 DATA 8D,05,D4,A9,0F,8D,18,D4
1079 DATA 60,20,61,15,A9,81,20,9C
1080 DATA 15,A9,80,20,9C,15,4C,96
1081 DATA 15,20,61,15,A9,11,20,9C
1082 DATA 15,A9,10,20,9C,15,A9,00
1083 DATA 8D,04,D4,60,8D,04,D4,A2
1084 DATA 70,A0,00,88,D0,FD,CA,D0
1085 DATA FA,60,END
```

END

128 Users Only/The 128 Mode

Continued from page 94

```
740 PRINT#4,TB$M1$'BIIH
745 PRINT#4,TB$M5$'BIMM
750 PRINT#4,TB$M1$'BIII
755 PRINT#4,TB$M3$'BIKN
760 NEXT'BAEH
765 CLOSE 4:OPEN 4,4,7:PRINT#4,
    PD$'DNQQ
770 PRINT#4:PRINT#4,UN$"[SHFT A]
    [SHFT C] [SHFT R] [SHFT O]
    [SHFT S] [SHFT S]"UF$,,,UN$"
    [SHFT D] [SHFT O] [SHFT W]
    [SHFT N]"UF$:PRINT#4'DVKX
775 AC=0:DN=0'CHUQ
780 DO UNTIL AC=>NB AND DN=>NB'HIUQ
785 DO:AC=AC+1:LOOP UNTIL CL$(0,
    AC)<>""OR AC>NB'JUCA
790 DO:DN=DN+1:LOOP UNTIL CL$(1,
    DN)<>""OR DN>NB'JUJV
795 A$=RIGHT$(" "+STR$(AC),2)+"-"
    :IF CL$(0,AC)=""THEN A$="[SPACE2]
    "'JWJB
800 D$=RIGHT$(" "+STR$(DN),2)+"-"
    :IF CL$(1,DN)=""THEN D$="[SPACE2]
    "'JWTN
805 X$=A$+LEFT$(CL$(0,AC)+SP$,
    36)+" "+D$+LEFT$(CL$(1,DN)+SP$,
    36)'JPPV
810 PRINT#4,X$'BEPE
815 LOOP'BAKI
820 CLOSE 4'BBLE
825 RETURN'BAQJ
```

END

128 Users Only/Simple Windowing

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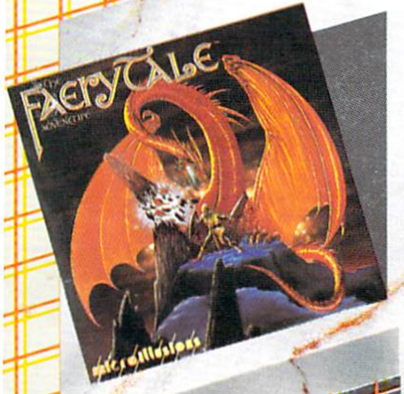
```
     EB'BEAE
2320 DATA 60,A0,00,A9,1F,8D,00,D6,2C,
     00'BEWF
2330 DATA D6,10,FB,AD,01,D6,91,FB,20,
     C2'BEEG
2340 DATA 0C,F0,EC,60,E6,FB,A5,FB,D0,
     02'BENH
2350 DATA E6,FC,A5,FC,CD,3D,0D,D0,03,
     A9'BEMI
2360 DATA 01,60,A9,00,60,A9,30,85,FC,
     A9'BEXJ
2370 DATA 00,85,FB,A9,40,8D,3D,0D,60,
     A9'BELK
2380 DATA 04,85,FC,A9,00,85,FB,A9,08,
     8D'BEYL
2390 DATA 3D,0D,60,A9,D8,85,FC,A9,00,
     85'BEVM
2400 DATA FB,A9,DC,8D,3D,0D,60,A9,1C,
     85'BEQE
2410 DATA FC,A9,00,85,FB,A9,40,8D,3D,
     0D'BEVF
2420 DATA 60,A9,D8,85,FC,A9,00,85,FB,
     A9'BETG
2430 DATA DC,8D,3D,0D,60,A2,00,A9,12,
     8D'BERH
2440 DATA 00,D6,2C,00,D6,10,FB,8E,01,
     D6'BEUI
2450 DATA A9,13,8D,00,D6,2C,00,D6,10,
     FB'BEWJ
2460 DATA 8E,01,D6,60,00,00,00,00,
     00'BBDJ
```

END

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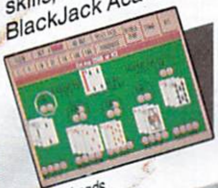


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